



Mahidol University  
International College

2025 - 2026

# MINORS & CERTIFICATES

Prepared For  
**STUDENTS WITH ID. 68XXXXX**

As of September 18th 2025





# MUIC

## MISSION

## VISION

“

*MUIC inspires innovation, fosters human potential, and creates new knowledge through the integration of arts and sciences in an international environment, ultimately resulting in education, research, and services to serve the needs of society and benefit humankind.*

”



**Enriching lives.**

**Expanding potentials.**

**Shaping futures.**

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**usiness**

# Business Economics

## Minors

- Minor in Business Administration - for non-Business Administration Program

To minor in Business Administration, students choose **FIVE courses** (no less than 20 Credits) out of the following courses.

ICMB 253 Microeconomics OR ICMB 254 Macroeconomics 4 (4-0-8)

ICMB 256 Principles of Financial Accounting 4 (4-0-8)

ICMB 259 Principles of Marketing 4 (4-0-8)

ICMB 260 Management and Organizational Behavior OR ICMB 261 Human Resources 4 (4-0-8)

Management

ICMB XXX Choose a core course(s) to meet the requirement of **4 credits** from the following list

without double counting the credits:

ICMB 150 Introduction to Programming and Business Applications 2 (2-0-4)

ICMB 152 Business Statistics 4 (4-0-8)

ICMB 253 Microeconomics 4 (4-0-8)

ICMB 254 Macroeconomics 4 (4-0-8)

ICMB 255 Management of Business Information 4 (4-0-8)

ICMB 257 Business Finance for Entrepreneurs 4 (4-0-8)

ICMB 258 Business Communication 4 (4-0-8)

ICMB 260 Management of Organizational Behavior 4 (4-0-8)

ICMB 261 Human Resource Management 4 (4-0-8)

ICMB 262 International Business Management 4 (4-0-8)

|                                             |           |
|---------------------------------------------|-----------|
| ICMB 350 Business Law                       | 4 (4-0-8) |
| ICMB 351 Business Ethics and Sustainability | 4 (4-0-8) |
| ICMB 352 Management Science                 | 4 (4-0-8) |
| ICMB 353 Operations Management              | 4 (4-0-8) |
| ICMB 450 Strategic Managements              | 4 (4-0-8) |

**Note I:** Student should pass ICGC 104 English Studies I: The Writer's Toolkit with “S” grade or be placed in the English course level higher ICGC 104 English Studies I: The Writer's Toolkit with a minimum of “S” AND pass ICMA 100 Foundation Mathematics.

**Note II:** Student can submit equivalent Mathematics scores or other equivalent prerequisite courses to the Division Chair for consideration of approval

**Note III:** Students must follow the pre-requisite of the courses taken.

## ● Minor in Business Analytics and Forecasting

To minor in Business Analytics and Forecasting, students need to choose **FIVE courses** (no less than 20 Credits) out of the following courses without double counting the credits with other course types (Core courses, Major required courses, and Major elective courses) specified in the curriculum.

|                                                        |           |
|--------------------------------------------------------|-----------|
| ICBE 313 Business Econometrics                         | 4 (4-0-8) |
| ICBE 421 Data Analytics in Economics and Finance       | 4 (4-0-8) |
| ICBE 422 Time Series Analysis                          | 4 (4-0-8) |
| ICMK 372 Market Intelligence – A Quantitative Approach | 4 (4-0-8) |
| ICMF 346 Machine Learning in Finance                   | 4 (4-0-8) |
| ICMI 358 People Analytics for Global Operations        | 4 (4-0-8) |
| ICCS 102 Coding for All                                | 4 (3-2-7) |
| ICCS 261 Principles of Data Science                    | 4 (3-2-7) |
| ICCS 271 Interaction Design                            | 4 (4-0-8) |
| ICCS 361 Data Mining                                   | 4 (4-0-8) |
| ICCS 461 Machine Learning                              | 4 (4-0-8) |

**Note :** Students must follow the pre-requisite of the courses taken.

- **Minor in Business Economics - for non-Business Economics Program**

To minor in Business Economics, non-Business Economics students need to complete the following **FIVE courses** (no less than 20 Credits) without double counting the credits with other course types (Core courses, Major required courses, and Major elective courses) specified in the curriculum.

|                                   |           |
|-----------------------------------|-----------|
| ICBE 311 Economics of Competition | 4 (4-0-8) |
| ICBE 312 World Economy            | 4 (4-0-8) |
| ICBE 313 Business Econometrics    | 4 (4-0-8) |
| ICBE 411 Economics of Innovation  | 4 (4-0-8) |
| ICBE 412 Economic Policy Analysis | 4 (4-0-8) |

# Finance

## Minors

- **Minor in Finance - for non-Finance Program**

To minor in “Finance”, non-finance students are required to complete the following **FIVE courses** without double counting the credits with other course types (Core courses, Major required courses, and Major elective courses) specified in the curriculum.

**Finance Minor (20 Credits)**

|                                                       |           |
|-------------------------------------------------------|-----------|
| ICMF 331 Financial Management                         | 4 (4-0-8) |
| ICMF 332 Financial Markets                            | 4 (4-0-8) |
| ICMF 333 Investment Analysis and Portfolio Management | 4 (4-0-8) |
| ICMF 334 Risk Management and Derivatives              | 4 (4-0-8) |
| ICMF 431 Financial Analysis and Modeling              | 4 (4-0-8) |

**Note I:** Student should pass ICGC 104 English Studies I: The Writer's Toolkit with “S” grade or be placed in the English course level higher than ICGC 104 English Studies I: The Writer's Toolkit with a minimum of “S” and pass ICMA 100 Foundation Mathematics.

**Note II:** Student can submit equivalent Mathematics scores or other equivalent prerequisite courses to the authorized person of the division for consideration of approval.

**Note III:** Students must follow the pre-requisite of the courses taken.

# International Business

## Minors

- Minor in International Business - for non-International Business Program

To minor in “international business”, non- international business students are required to complete the following **FIVE courses** (20 Credits) without double counting the credits with other course types (Core courses, Major required courses, and Major elective courses) specified in the curriculum.

|                                                                               |           |
|-------------------------------------------------------------------------------|-----------|
| ICMI 350 Global Logistics and Supply Chain Management                         | 4 (4-0-8) |
| ICMI 351 Global Trade, Policies, and Regulations                              | 4 (4-0-8) |
| ICMI 352 Diversity, Cross Culture and Expatriate Management                   | 4 (4-0-8) |
| ICMI 450 International Finance and Risk Management for International Business | 4 (4-0-8) |
| ICMI 451 Global Strategy                                                      | 4 (4-0-8) |

**Note I:** non-Business Administration students can submit equivalent Mathematics scores or other equivalent prerequisite course to the Program Director of International Business for consideration of approval.

**Note II:** Students must follow the pre-requisite of the courses taken.

- Minor in People and Organizational Management

To minor in People and Organizational Management, students need to choose **FIVE courses** (no less than 20 Credits) out of the following courses without double counting the credits with other course types (Core courses, Major required courses, and Major elective courses) specified in the curriculum.

|                                                                                                 |           |
|-------------------------------------------------------------------------------------------------|-----------|
| ICMB 260 Management and Organizational Behavior                                                 | 4 (4-0-8) |
| ICMB 261 Human Resources Management                                                             | 4 (4-0-8) |
| ICMI 352 Diversity, Cross Culture and Expatriate Management                                     | 4 (4-0-8) |
| ICMI 355 Leadership and Change Management in Global Business                                    | 4 (4-0-8) |
| ICMI 357 Advancing Diversity, Equity, Inclusion, and Belonging (DEIB) in International Business | 4 (4-0-8) |
| ICMI 358 People Analytics for Global Operations                                                 | 4 (4-0-8) |
| ICMI 359 International Business Negotiation                                                     | 4 (4-0-8) |
| ICMI 452 Special Topics in International Business                                               | 4 (4-0-8) |

**Note I:** non-Business Administration students can submit equivalent Mathematics scores or other equivalent prerequisite course to the Program Director of International Business for consideration of approval.

**Note II:** Students must follow the pre-requisite of the courses taken.

# Certificate

## ● Certificate in People and Organizational Management

To earn a certificate in People and Organizational Management, students need to choose **THREE courses** (no less than 12 Credits) out of the following courses without double counting the credits with other course types (Core courses, Major required courses, and Major elective courses) specified in the curriculum.

|                                                                                                 |           |
|-------------------------------------------------------------------------------------------------|-----------|
| ICMI 352 Diversity, Cross Culture and Expatriate Management                                     | 4 (4-0-8) |
| ICMI 355 Leadership and Change Management in Global Business                                    | 4 (4-0-8) |
| ICMI 357 Advancing Diversity, Equity, Inclusion, and Belonging (DEIB) in International Business | 4 (4-0-8) |
| ICMI 358 People Analytics for Global Operations                                                 | 4 (4-0-8) |
| ICMI 359 International Business Negotiation                                                     | 4 (4-0-8) |
| ICMI 452 Special Topics in International Business                                               | 4 (4-0-8) |

**Note I:** non-Business Administration students can submit equivalent Mathematics scores or other equivalent prerequisite course to the Program Director of International Business for consideration of approval.

**Note II:** Students must follow the pre-requisite of the courses taken.

# Marketing

## Minors

- Minor in Marketing - for non-Marketing Program

To minor in Marketing, students need to complete the following **FIVE courses** (no less than 20 Credits).

|                                                        |           |
|--------------------------------------------------------|-----------|
| ICMB 371 Consumer Insights – A Qualitative Approach    | 4 (4-0-8) |
| ICMK 372 Market Intelligence – A Quantitative Approach | 4 (4-0-8) |
| ICMK 373 Consumer Behavior and Decision Making         | 4 (4-0-8) |
| ICMK 379 Digital Marketing                             | 4 (4-0-8) |
| ICMK 479 Marketing Strategy for Sustainability         | 4 (4-0-8) |

**Note I:** non-Business Administration students can submit equivalent Mathematics scores or other equivalent prerequisite courses to the Program Director of Marketing for consideration of approval.

# Certificate

- **Certificate in Sustainable Marketing - for non-Marketing Program**

non-Marketing major students can choose to earn a **12-credit** certificate in Sustainable Marketing and must comply with the certificate course offering below; of which those credits cannot be double-counted towards fulfilling other course types (Core courses, Major required courses, and Major elective courses).

|                             |           |
|-----------------------------|-----------|
| ICMK 380 Societal Marketing | 4 (4-0-8) |
|-----------------------------|-----------|

|                                                |           |
|------------------------------------------------|-----------|
| ICMK 479 Marketing Strategy for Sustainability | 4 (4-0-8) |
|------------------------------------------------|-----------|

And any one of the following:

|                                      |           |
|--------------------------------------|-----------|
| ICBE 322 Economics of Sustainability | 4 (4-0-8) |
|--------------------------------------|-----------|

|                                             |           |
|---------------------------------------------|-----------|
| ICMF 347 Sustainable Finance and Investment | 4 (4-0-8) |
|---------------------------------------------|-----------|

|                                                    |           |
|----------------------------------------------------|-----------|
| ICMI 356 ESG in Global Business and Sustainability | 4 (4-0-8) |
|----------------------------------------------------|-----------|

|                                                    |           |
|----------------------------------------------------|-----------|
| ICMI 455 Sustainable Innovation & Entrepreneurship | 4 (4-0-8) |
|----------------------------------------------------|-----------|



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# Communication

## Design

### Minors

- **Minor in Creative Animation**

|                                                 |           |
|-------------------------------------------------|-----------|
| ICFA 232 Moving Images by Design                | 4 (2-4-6) |
| ICFA 233 Storytelling by Design                 | 4 (4-0-8) |
| ICFA 334 Animation Principles and Production    | 4 (2-4-6) |
| ICFA 335 Character and Concept Design           | 4 (2-4-6) |
| ICFA 336 Cinematic Language and Its Application | 4 (4-0-8) |

- **Minor in Film Arts**

|                                                 |           |
|-------------------------------------------------|-----------|
| ICFA 233 Storytelling by Design                 | 4 (4-0-8) |
| ICFA 336 Cinematic Language and Its Application | 4 (4-0-8) |
| ICFA 337 Thai and ASEAN Cinema                  | 4 (4-0-8) |
| ICFA 338 Short Film Production                  | 4 (2-4-6) |
| ICFA 339 Film Genre and Gender                  | 4 (4-0-8) |

# Media and Communication Minors

The program offers three minors from which non-major students can choose. To fulfill the requirements, students need to complete **FIVE courses** (20 credits) from the below list of minor courses.

- Minor in Communication for Success – for non-Media and Communication Program

|                                                          |           |
|----------------------------------------------------------|-----------|
| ICMC 113 Introduction to Communication and Collaboration | 4 (4-0-8) |
| ICMC 209 Creativity and Digital Communication            | 4 (4-0-8) |
| ICMC 238 Foundations of Organizational Communication     | 4 (4-0-8) |
| ICMC 239 Pitching and Presenting for Success             | 4 (4-0-8) |
| ICMC 243 Persuasion and Negotiation                      | 4 (4-0-8) |

- Minor in Media and Communication for non-Media and Communication Program

|                                                   |           |
|---------------------------------------------------|-----------|
| ICMC 102 Man and Arts for Media and Communication | 4 (4-0-8) |
| ICMC 108 Visual Culture and Sociology             | 4 (4-0-8) |
| ICMC 112 Media and Culture in the Digital Age     | 4 (4-0-8) |
| ICMC 208 Transmedia Storytelling                  | 4 (4-0-8) |
| ICMC 217 Media Psychology                         | 4 (4-0-8) |

- Minor in Performing Arts for non-Media and Communication Program

|                                            |           |
|--------------------------------------------|-----------|
| ICMC 210 Basic Acting                      | 4 (2-4-6) |
| ICMC 240 Storytelling for Content Creation | 4 (4-0-8) |
| ICMC 308 Theatre Production I              | 4 (2-4-6) |
| ICMC 309 Theatre Management I              | 4 (2-4-6) |
| ICMC 310 Theatre Production II             | 4 (2-4-6) |



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# Intercultural Studies and Languages

## Minors

- **Minor in Applied Ethics, Behavioral Analysis and Social Engineering**

The Intercultural Studies and Languages program (ICIC) offers a minor in ‘Applied Ethics, Behavioral Analysis and Social Engineering’ (no less than 20 credits) to students from all majors in Mahidol University International College:

1. Students who wish to obtain a minor in ‘Applied Ethics and Behavioral Science’ need to first complete the following **TWO Required Courses**.

|                              |           |
|------------------------------|-----------|
| ICIC 356 Ethics and Politics | 4 (4-0-8) |
|------------------------------|-----------|

|                                          |           |
|------------------------------------------|-----------|
| ICIC 375 Behavior, Ethics and Technology | 4 (4-0-8) |
|------------------------------------------|-----------|

2. Students who wish to obtain a minor in ‘Applied Ethics and Behavioral Science’ need to then complete any **THREE courses** from the list below.

|                        |           |
|------------------------|-----------|
| ICIC 253 Value Studies | 4 (4-0-8) |
|------------------------|-----------|

|                                       |           |
|---------------------------------------|-----------|
| ICIC 355 Judgment and Decision Making | 4 (4-0-8) |
|---------------------------------------|-----------|

|                                  |           |
|----------------------------------|-----------|
| ICIC 357 Philosophy of Economics | 4 (4-0-8) |
|----------------------------------|-----------|

|                               |           |
|-------------------------------|-----------|
| ICIC 358 Behavioral Economics | 4 (4-0-8) |
|-------------------------------|-----------|

|                                                        |           |
|--------------------------------------------------------|-----------|
| ICIC 373 Reason and Passion: The Philosophy of Emotion | 4 (4-0-8) |
|--------------------------------------------------------|-----------|

- **Minor in Cognitive Science: Language, Mind, and Brain - for non-Intercultural Studies and Languages Program**

The Intercultural Studies and Languages program (ICIC) offers an interdisciplinary minor in ‘Cognitive Science: Language, Mind, and Brain’ to students from all majors in Mahidol University International College: Students who wish to obtain a minor in ‘Cognitive Science: Language, Mind, and Brain’ need to meet the following requirements:

1. non-ICIC students who wish to obtain a minor in ‘Cognitive Science: Language, Mind, and Brain’ (no less than 20 credits) need to complete the following **FOUR required courses (16 Credits)**.

|                                                 |           |
|-------------------------------------------------|-----------|
| ICSP 113 General Psychology                     | 4 (4-0-8) |
| ICIC 252 Formal Reasoning: Human and Artificial | 4 (4-0-8) |
| ICIC 258 Language: The Human Essence            | 4 (4-0-8) |
| ICIC 453 Research Seminar                       | 4 (4-0-8) |

**Note:** ICIC453 Research Seminar to be taken as the last course in the minor (capstone)

Prerequisite: None

2. non-ICIC students who wish to obtain a minor in ‘Cognitive Science: Language, Mind, and Brain’ need to complete any course from the list below **(4 Credits)**.

|                                                 |           |
|-------------------------------------------------|-----------|
| ICSP 259 Developmental Psychology               | 4 (4-0-8) |
| ICSP 350 Evolutionary Psychology                | 4 (4-0-8) |
| ICIC 371 Minds and Machines                     | 4 (4-0-8) |
| ICIC 376 Information, Knowledge, Representation | 4 (4-0-8) |
| ICBI 341 Neurobiology                           | 4 (4-0-8) |

## ● Minor in Cognitive Science: Language, Mind, and Brain - for Intercultural Studies and Languages Program

1. ICIC students who wish to obtain a minor in ‘Cognitive Science: Language, Mind, and Brain’ (no less than 20 credits) need to complete the following **TWO required courses (8 credits)**.

|                             |           |
|-----------------------------|-----------|
| ICSP 113 General Psychology | 4 (4-0-8) |
| ICIC 453 Research Seminar   | 4 (4-0-8) |

**Note:** ICIC453 Research Seminar to be taken as the last course in the minor (capstone)

Prerequisite: None

2. ICIC students who wish to obtain a minor in ‘Cognitive Science: Language, Mind, and Brain’ need to complete any **THREE courses** from the list below (12 credits).

|                                                 |           |
|-------------------------------------------------|-----------|
| ICSP 259 Developmental Psychology               | 4 (4-0-8) |
| ICSP 350 Evolutionary Psychology                | 4 (4-0-8) |
| ICIC 371 Minds and Machines                     | 4 (4-0-8) |
| ICIC 376 Information, Knowledge, Representation | 4 (4-0-8) |
| ICBI 341 Neurobiology                           | 4 (4-0-8) |

## ● Minor in Critical Cultural Literacy

The Intercultural Studies and Languages program (ICIC) offers a minor in ‘Critical Cultural Literacy’ to students from all majors in Mahidol University International College: Students who wish to obtain a minor in ‘Critical Cultural Literacy’ need to complete any **FIVE courses** (no less than 20 credits) from the list below.

|                                                        |           |
|--------------------------------------------------------|-----------|
| ICIC 251 Contemporary Southeast Asia: Cultural Studies | 4 (4-0-8) |
| ICIC 259 Intercultural Communication                   | 4 (4-0-8) |
| ICIC 351 Thinking the Other                            | 4 (4-0-8) |
| ICIC 355 Judgment and Decision Making                  | 4 (4-0-8) |
| ICIC 364 Literary Theory and Criticism                 | 4 (4-0-8) |

|                                                           |           |
|-----------------------------------------------------------|-----------|
| ICIC 366 Popular Culture                                  | 4 (4-0-8) |
| ICIC 367 Narratives, Nations, and Nationalism             | 4 (4-0-8) |
| ICIC 368 Language, Power and Culture                      | 4 (4-0-8) |
| ICIC 372 From Modernism to Postmodernism                  | 4 (4-0-8) |
| ICIC 380 Postcolonialism                                  | 4 (4-0-8) |
| ICIC 381 Selected Topics in Literary and Cultural Studies | 4 (4-0-8) |

## ● Minor in Foreign Language – Chinese

The Intercultural Studies and Languages program (ICIC) offers a minor in ‘Foreign Language – Chinese’ to students from all majors in Mahidol University International College: Students who wish to obtain a minor in ‘Foreign Language – Chinese’ need to complete all the **FIVE courses** (no less than 20 credits) listed below.

If their placement test result is below the Intermediate level, they will have to complete prior levels as prerequisites. Special cases will be taken under consideration by the Foreign Languages Program Director and Chair of the Humanities and Language Division.

|                                                          |           |
|----------------------------------------------------------|-----------|
| ICIC 331 Intermediate Chinese I - Language and Culture   | 4 (4-0-8) |
| ICIC 332 Intermediate Chinese II - Language and Culture  | 4 (4-0-8) |
| ICIC 333 Intermediate Chinese III - Language and Culture | 4 (4-0-8) |
| ICIC 431 Advanced Chinese I – Language and Culture       | 4 (4-0-8) |
| ICIC 432 Advanced Chinese II - Language and Culture      | 4 (4-0-8) |

**Note I:** ICIC students who start from the Elementary I level or are placed below the Intermediate level can count prerequisites as free elective courses, major elective courses (L2 requirements) or additional credits.

## ● Minor in Foreign Language – French

The Intercultural Studies and Languages program (ICIC) offers a minor in ‘Foreign Language – French’ to students from all majors in Mahidol University International College: Students who wish to obtain a minor in ‘Foreign Language – French’ need to complete all the **FIVE courses** (no less than 20 credits) listed below.

If their placement test result is below the Intermediate level, they will have to complete prior levels as prerequisites. Special cases will be taken under consideration by the Foreign Languages Program Director and Chair of the Humanities and Language Division.

|                                                         |           |
|---------------------------------------------------------|-----------|
| ICIC 321 Intermediate French I - Language and Culture   | 4 (4-0-8) |
| ICIC 322 Intermediate French II - Language and Culture  | 4 (4-0-8) |
| ICIC 323 Intermediate French III - Language and Culture | 4 (4-0-8) |
| ICIC 421 Advanced French I – Language and Culture       | 4 (4-0-8) |
| ICIC 422 Advanced French II - Language and Culture      | 4 (4-0-8) |

**Note I:** ICIC students who start from the Elementary I level or are placed below the Intermediate level can count prerequisites as free elective courses, major elective courses (L2 requirements) or additional credits.

## ● Minor in Foreign Language – German

The Intercultural Studies and Languages program (ICIC) offers a minor in ‘Foreign Language – German’ to students from all majors in Mahidol University International College: Students who wish to obtain a minor in ‘Foreign Language – German’ need to complete all the **FIVE courses** (no less than 20 credits) listed below.

If their placement test result is below the Intermediate level, they will have to complete prior levels as prerequisites. Special cases will be taken under consideration by the Foreign Languages Program Director and Chair of the Humanities and Language Division.

|                                                         |           |
|---------------------------------------------------------|-----------|
| ICIC 301 Intermediate German I - Language and Culture   | 4 (4-0-8) |
| ICIC 302 Intermediate German II - Language and Culture  | 4 (4-0-8) |
| ICIC 303 Intermediate German III - Language and Culture | 4 (4-0-8) |
| ICIC 401 Advanced German I – Language and Culture       | 4 (4-0-8) |
| ICIC 402 Advanced German II - Language and Culture      | 4 (4-0-8) |

**Note I:** ICIC students who start from the Elementary I level or are placed below the Intermediate level can count prerequisites as free elective courses, major elective courses (L2 requirements) or additional credits.

## ● Minor in Foreign Language – Japanese

The Intercultural Studies and Languages program (ICIC) offers a minor in ‘Foreign Language – Japanese’ to students from all majors in Mahidol University International College: Students who wish to obtain a minor in ‘Foreign Language – Japanese’ need to complete all the **FIVE courses** (no less than 20 credits) listed below.

If their placement test result is below the Intermediate level, they will have to complete prior levels as prerequisites. Special cases will be taken under consideration by the Foreign Languages Program Director and Chair of the Humanities and Language Division.

|                                                           |           |
|-----------------------------------------------------------|-----------|
| ICIC 311 Intermediate Japanese I - Language and Culture   | 4 (4-0-8) |
| ICIC 312 Intermediate Japanese II - Language and Culture  | 4 (4-0-8) |
| ICIC 313 Intermediate Japanese III - Language and Culture | 4 (4-0-8) |
| ICIC 411 Advanced Japanese I – Language and Culture       | 4 (4-0-8) |
| ICIC 412 Advanced Japanese II - Language and Culture      | 4 (4-0-8) |

**Note I:** ICIC students who start from the Elementary I level or are placed below the Intermediate level can count prerequisites as free elective courses, major elective courses (L2 requirements) or additional credits.

## ● Minor in Foreign Language – Spanish

The Intercultural Studies and Languages program (ICIC) offers a minor in ‘Foreign Language – Spanish’ to students from all majors in Mahidol University International College. Students who wish to obtain a minor in ‘Foreign Language – Spanish’ need to complete all the **FIVE courses** (no less than 20 credits) listed below.

If their placement test result is below the Intermediate level, they will have to complete prior levels as prerequisites. Special cases will be taken under consideration by the Foreign Languages Program Director and Chair of the Humanities and Language Division.

|                                                          |           |
|----------------------------------------------------------|-----------|
| ICIC 341 Intermediate Spanish I - Language and Culture   | 4 (4-0-8) |
| ICIC 342 Intermediate Spanish II - Language and Culture  | 4 (4-0-8) |
| ICIC 343 Intermediate Spanish III - Language and Culture | 4 (4-0-8) |
| ICIC 441 Advanced Spanish I – Language and Culture       | 4 (4-0-8) |

ICIC 442 Advanced Spanish II - Language and Culture

4 (4-0-8)

**Note I:** ICIC students who start from the Elementary I level or are placed below the Intermediate level can count prerequisites as free elective courses, major elective courses (L2 requirements) or additional credits.

## ● Minor in Human and Artificial Intelligence

The Intercultural Studies and Languages program (ICIC) offers a minor in 'Human and Artificial Intelligence' (no less than 20 credits) to students from all majors in Mahidol University International College:

1. Students who wish to obtain a minor in 'Human and Artificial Intelligence' need to first complete the following **TWO Compulsory Courses**.

ICIC 371 Minds and Machines

4 (4-0-8)

ICIC 376 Information, Knowledge, Representation

4 (4-0-8)

2. Students who wish to obtain a minor in 'Human and Artificial Intelligence' need to then complete any **THREE courses** from the list below.

EGCI 461 Artificial Intelligence

4 (4-0-8)

ICCS 102 Coding for All

4 (4-0-8)

ICIC 252 Formal Reasoning: Human and Artificial

4 (4-0-8)

ICIC 369 Humanity Today: Between Science and Fiction

4 (4-0-8)

ICIC 373 Reason and Passion: The Philosophy of Emotion

4 (4-0-8)

# Certificates

## ● Certificate in Elementary Chinese

This module develops the abilities to conduct basic communication exchanges about personal topics in Chinese in consideration of the cultural and social aspects (Reference of the HSK Level 2 – Chinese Language Proficiency Test). Students who wish to obtain a certificate in ‘Elementary Chinese’ need to complete the following **THREE required courses** (12 Credits).

|                                 |           |
|---------------------------------|-----------|
| ICGL 131 Elementary Chinese I   | 4 (4-0-8) |
| ICGL 132 Elementary Chinese II  | 4 (4-0-8) |
| ICGL 133 Elementary Chinese III | 4 (4-0-8) |

## ● Certificate in Elementary French

This module develops the abilities to conduct basic communication exchanges about personal topics in French in consideration of the cultural and social aspects (Level A1 of the Common European Framework of Reference for Languages). Students who wish to obtain a certificate in ‘Elementary French’ need to complete the following **THREE required courses** (12 Credits).

|                                |           |
|--------------------------------|-----------|
| ICGL 121 Elementary French I   | 4 (4-0-8) |
| ICGL 122 Elementary French II  | 4 (4-0-8) |
| ICGL 123 Elementary French III | 4 (4-0-8) |

## ● Certificate in Elementary German

This module develops the abilities to conduct basic communication exchanges about personal topics in German in consideration of the cultural and social aspects (Level A1 of the Common European Framework of Reference for Languages). Students who wish to obtain a certificate in ‘Elementary German’ need to complete the following **THREE required courses** (12 Credits).

|                                |           |
|--------------------------------|-----------|
| ICGL 101 Elementary German I   | 4 (4-0-8) |
| ICGL 102 Elementary German II  | 4 (4-0-8) |
| ICGL 103 Elementary German III | 4 (4-0-8) |

## ● Certificate in Elementary Japanese

This module develops the abilities to conduct basic communication exchanges about personal topics in Japanese in consideration of the cultural and social aspects (Reference of the N5 Level of the Japanese Language Proficiency Test). Students who wish to obtain a certificate in ‘Elementary Japanese’ need to complete the following **THREE required courses** (12 Credits).

|                                  |           |
|----------------------------------|-----------|
| ICGL 111 Elementary Japanese I   | 4 (4-0-8) |
| ICGL 112 Elementary Japanese II  | 4 (4-0-8) |
| ICGL 113 Elementary Japanese III | 4 (4-0-8) |

## ● Certificate in Elementary Spanish

This module develops the abilities to conduct basic communication exchanges about personal topics in Spanish in consideration of the cultural and social aspects (Level A1 of the Common European Framework of Reference for Languages). Students who wish to obtain a certificate in ‘Elementary Spanish’ need to complete the following **THREE required courses** (12 Credits).

|                                 |           |
|---------------------------------|-----------|
| ICGL 141 Elementary Spanish I   | 4 (4-0-8) |
| ICGL 142 Elementary Spanish II  | 4 (4-0-8) |
| ICGL 143 Elementary Spanish III | 4 (4-0-8) |

## ● Certificate in Elementary Thai (for International Students)

This module develops the abilities to conduct basic communication exchanges about personal topics in Thai in consideration of the cultural and social aspects (Beginner Level of the Thai Competency Test for Foreigners). Students who wish to obtain a certificate in ‘Elementary Thai’ need to complete the following **THREE required courses** (12 Credits).

|                            |           |
|----------------------------|-----------|
| ICGL 161 Elementary Thai I | 4 (4-0-8) |
|----------------------------|-----------|

|                              |           |
|------------------------------|-----------|
| ICGL 162 Elementary Thai II  | 4 (4-0-8) |
| ICGL 163 Elementary Thai III | 4 (4-0-8) |

## ● Certificate in Pre-intermediate Chinese

This module develops the abilities to conduct simple and effective communication exchanges about personal and routine topics in Chinese in consideration of cultural and social aspects (Reference of the HSK Level 3 – Chinese Language Proficiency Test). Students who wish to obtain a certificate in ‘Pre-intermediate Chinese’ need to complete the following **THREE required courses** (12 Credits).

|                                       |           |
|---------------------------------------|-----------|
| ICGL 231 Pre-intermediate Chinese I   | 4 (4-0-8) |
| ICGL 232 Pre-intermediate Chinese II  | 4 (4-0-8) |
| ICGL 233 Pre-intermediate Chinese III | 4 (4-0-8) |

## ● Certificate in Pre-intermediate French

This module develops the abilities to conduct simple and effective communication exchanges about personal and routine topics in French in consideration of cultural and social aspects (Level A2 of the Common European Framework of Reference for Languages). Students who wish to obtain a certificate in ‘Pre-intermediate French’ need to complete the following **THREE required courses** (12 Credits).

|                                      |           |
|--------------------------------------|-----------|
| ICGL 221 Pre-intermediate French I   | 4 (4-0-8) |
| ICGL 222 Pre-intermediate French II  | 4 (4-0-8) |
| ICGL 223 Pre-intermediate French III | 4 (4-0-8) |

## ● Certificate in Pre-intermediate German

This module develops the abilities to conduct simple and effective communication exchanges about personal and routine topics in German in consideration of cultural and social aspect. (Level A2 of the Common European Framework of Reference for Languages). Students who wish to obtain a certificate in ‘Pre-intermediate German’ need to complete the following **THREE required courses** (12 Credits).

|                                     |           |
|-------------------------------------|-----------|
| ICGL 201 Pre-intermediate German I  | 4 (4-0-8) |
| ICGL 202 Pre-intermediate German II | 4 (4-0-8) |

## ● Certificate in Pre-intermediate Japanese

This module develops the abilities to conduct simple and effective communication exchanges about personal and routine topics in Japanese in consideration of cultural and social aspects (Reference of the N4 Level of the Japanese Language Proficiency Test). Students who wish to obtain a certificate in 'Pre-intermediate Japanese' need to complete the following **THREE required courses** (12 Credits).

|                                        |           |
|----------------------------------------|-----------|
| ICGL 211 Pre-intermediate Japanese I   | 4 (4-0-8) |
| ICGL 212 Pre-intermediate Japanese II  | 4 (4-0-8) |
| ICGL 213 Pre-intermediate Japanese III | 4 (4-0-8) |

## ● Certificate in Pre-intermediate Spanish

This module develops the abilities to conduct simple and effective communication exchanges about personal and routine topics in Spanish in consideration of cultural and social aspects (Level A2 of the Common European Framework of Reference for Languages). Students who wish to obtain a certificate in 'Pre-intermediate Spanish' need to complete the following **THREE required courses** (12 Credits).

|                                       |           |
|---------------------------------------|-----------|
| ICGL 241 Pre-intermediate Spanish I   | 4 (4-0-8) |
| ICGL 242 Pre-intermediate Spanish II  | 4 (4-0-8) |
| ICGL 243 Pre-intermediate Spanish III | 4 (4-0-8) |



**International**



**Relations**

# International Relations and Global Affairs Minors

## Social Science Division Minor Programs

The Social Science Division has three (3) minor programs which are offered to students from all majors at Mahidol University International College. All students who choose to register and complete a minor in the Social Science Division need to complete **FIVE courses** (no less than 20 credits) from the courses offered in their selected minor:

- 1) Global Affairs Minor
- 2) International Relations Minor
- 3) Psychology Minor

**Note I:** Students majoring in International Relations and Global Affairs cannot take the following minor programs: International Relations Minor; Global Affairs Minor.

**Note II:** Students majoring International Relations and Global Affairs can only take the Psychology minor offered by the Social Science Division if they want to complete a minor offered by the Social Science Division.

**Note III:** Students majoring International Relations and Global Affairs can take minors from other Divisions without restriction and within requirements of minors offered by other Divisions.

## ● Minor in Global Affairs - for non-International Relations and Global Affairs Program

Program-Level Learning Outcomes (PLOs)

At the end of the minor, successful students will be able to:

PLO1 Explain foundations and functions of actors in conducting relations on sub-national, national and international levels.

PLO2 Apply major theories from different disciplinary fields to issues and phenomena in global affairs.

PLO3 Present ideas and arguments in relation to issues in contemporary global affairs in a principled ethical manner.

PLO4 Conduct themselves in a professional and constructive manner in multicultural environments based on respect for cultural differences and work effectively in diverse groups.

### **Elective Minor Courses (no less than 20 credits)**

|                                                                                                               |           |
|---------------------------------------------------------------------------------------------------------------|-----------|
| ICIR 101 Approaches to International Relations and Global Affairs                                             | 4 (4-0-8) |
| ICIR 102 Approaches to Comparative Politics and Systems                                                       | 4 (4-0-8) |
| ICIR 201 The Formation of the Modern World: From the Industrial Revolution to High Imperialism                | 4 (4-0-8) |
| ICIR 202 Globalization and the International Order in the Twentieth Century: From the First World War to 9/11 | 4 (4-0-8) |
| ICIR 203 Foundations of Political Thought                                                                     | 4 (4-0-8) |
| ICIR 211 Globalization and Social Change                                                                      | 4 (4-0-8) |
| ICIR 213 Conflict, War and Peace Studies                                                                      | 4 (4-0-8) |
| ICIR 217 Culture and Power                                                                                    | 4 (4-0-8) |
| ICIR 219 Genders and Sexual Diversity in the Globalized World                                                 | 4 (4-0-8) |
| ICIR 221 International Political Economy                                                                      | 4 (4-0-8) |
| ICIR 212 Social Institutions of the Modern World                                                              | 4 (4-0-8) |
| ICIR 214 Perspectives on Thailand                                                                             | 4 (4-0-8) |
| ICIR 227 Approaches to Culture and Society                                                                    | 4 (4-0-8) |
| ICIR 228 Europe and the 'West' in the Contemporary World                                                      | 4 (4-0-8) |
| ICIR 229 Environment and Natural Resources in Global Affairs                                                  | 4 (4-0-8) |
| ICIR 237 International Economic Relations                                                                     | 4 (4-0-8) |
| ICIR 238 Politics and Identity in Cold War Europe, 1945-1991                                                  | 4 (4-0-8) |
| ICIR 239 Nations and Nationalisms                                                                             | 4 (4-0-8) |

|                                                                                      |           |
|--------------------------------------------------------------------------------------|-----------|
| ICIR 241 International Relations of South Asia: From Imperialism to the Modern World | 4 (4-0-8) |
| ICIR 244 Sustainable Development: Politics and Practice                              | 4 (4-0-8) |
| ICIR 302 ASEAN and Southeast Asian Regionalism                                       | 4 (4-0-8) |
| ICIR 306 Intelligence, Data and Surveillance                                         | 4 (4-0-8) |
| ICIR 307 The United Nations and Contemporary World Politics                          | 4 (4-0-8) |
| ICIR 308 Political Islam                                                             | 4 (4-0-8) |
| ICIR 313 Human Rights and International Relations                                    | 4 (4-0-8) |
| ICIR 314 International Development Studies                                           | 4 (4-0-8) |
| ICIR 324 Society and Technology in the Modern World                                  | 4 (4-0-8) |
| ICIR 325 Migration, Diasporas and the Politics of Space                              | 4 (4-0-8) |
| ICIR 327 Ethnicity and Representation in International Affairs                       | 4 (4-0-8) |
| ICIR 331 Religion and Politics in the Contemporary World                             | 4 (4-0-8) |

**Note:** Alternative courses may be substituted to complete the minor if approved by the Program Director and Chair of the division prior to registration. In this case students should submit a request before registering for any IRGA courses outside of those listed above.

## ● Minor in International Relations - for non-International Relations and Global Affairs Program

Program-Level Learning Outcomes (PLOs)

At the end of the minor, successful students will be able to:

PLO1 Explain the foundations and functions of state and non-state actors in conducting relations on an international level.

PLO2 Apply major theories in international relations to different actors and how they relate to one another.

PLO3 Present ideas and arguments in relation to issues in contemporary international affairs in a principled ethical manner.

PLO4 Conduct themselves in a professional and constructive manner in multicultural environments based on respect for cultural differences and work effectively in diverse groups.

### 1. Compulsory Minor Course (4 credits)

|                                                                   |           |
|-------------------------------------------------------------------|-----------|
| ICIR 101 Approaches to International Relations and Global Affairs | 4 (4-0-8) |
|-------------------------------------------------------------------|-----------|

## 2. Elective Minor Courses (no less than 16 credits)

|                                                                                                                  |           |
|------------------------------------------------------------------------------------------------------------------|-----------|
| ICIR 102 Approaches to Comparative Politics and Systems                                                          | 4 (4-0-8) |
| ICIR 201 The Formation of the Modern World: From the Industrial Revolution<br>to High Imperialism                | 4 (4-0-8) |
| ICIR 202 Globalization and the International Order in the Twentieth Century:<br>From the First World War to 9/11 | 4 (4-0-8) |
| ICIR 203 Foundations of Political Thought                                                                        | 4 (4-0-8) |
| ICIR 204 Perspectives on International Relations                                                                 | 4 (4-0-8) |
| ICIR 211 Globalization and Social Change                                                                         | 4 (4-0-8) |
| ICIR 213 Conflict, War and Peace Studies                                                                         | 4 (4-0-8) |
| ICIR 215 Thai Foreign Policy                                                                                     | 4 (4-0-8) |
| ICIR 218 Authoritarian Populism                                                                                  | 4 (4-0-8) |
| ICIR 221 International Political Economy                                                                         | 4 (4-0-8) |
| ICIR 222 International Organizations                                                                             | 4 (4-0-8) |
| ICIR 223 Democracy as a Political System                                                                         | 4 (4-0-8) |
| ICIR 224 Security and Conflict in a Global Perspective                                                           | 4 (4-0-8) |
| ICIR 225 Global Media, Social Change and International Relations                                                 | 4 (4-0-8) |
| ICIR 226 The History and Concept of Diplomacy                                                                    | 4 (4-0-8) |
| ICIR 239 Nations and Nationalisms                                                                                | 4 (4-0-8) |
| ICIR 242 Geopolitics and Geoeconomics                                                                            | 4 (4-0-8) |
| ICIR 243 US Foreign Policy: 1945-Present                                                                         | 4 (4-0-8) |
| ICIR 302 ASEAN and Southeast Asian Regionalism                                                                   | 4 (4-0-8) |
| ICIR 303 Transnational Movements and Migration                                                                   | 4 (4-0-8) |
| ICIR 304 Transnational Crime                                                                                     | 4 (4-0-8) |
| ICIR 305 Conflict Resolution                                                                                     | 4 (4-0-8) |
| ICIR 307 The United Nations and Contemporary World Politics                                                      | 4 (4-0-8) |
| ICIR 309 Public Diplomacy and Nation Branding                                                                    | 4 (4-0-8) |
| ICIR 311 Foreign Policy Analysis                                                                                 | 4 (4-0-8) |
| ICIR 312 International Law and International Relations                                                           | 4 (4-0-8) |
| ICIR 313 Human Rights and International Relations                                                                | 4 (4-0-8) |
| ICIR 314 International Development Studies                                                                       | 4 (4-0-8) |
| ICIR 321 Political Risk, Business and International Relations                                                    | 4 (4-0-8) |
| ICIR 322 The Politics and Economics of Non-Governmental Organizations                                            | 4 (4-0-8) |
| ICIR 323 The Practice of Diplomacy                                                                               | 4 (4-0-8) |

|                                                             |           |
|-------------------------------------------------------------|-----------|
| ICIR 328 Citizenship and Transnationalism                   | 4 (4-0-8) |
| ICIR 332 Comparative Regionalism                            | 4 (4-0-8) |
| ICIR 334 Terrorism, Counterterrorism and Political Violence | 4 (4-0-8) |

**Note I:** Students who choose the International Relations minor must register and complete ICIR 101 Approaches to International Relations.

**Note II:** Students may choose any **FOUR courses** from the list of Elective Minor Courses above in addition to ICIR 101 to complete the International Relations minor.

**Note III:** Alternative courses may be substituted to complete the minor if approved by the Program Director and Chair of the division prior to registration. In this case students should submit a request before registering for any IRGA courses outside of those listed above.

## ● Minor in Psychology

Program-Level Learning Outcomes (PLOs)

At the end of the minor, successful students will be able to:

PLO1 synthesize key concepts, principles, and overarching themes in psychology using appropriate terminology.

PLO2 analyze psychological research findings by examining methods and data interpretation techniques.

PLO3 apply psychological principles to address personal, social, and organizational issues, demonstrating problem-solving and critical thinking skills.

PLO4 communicate psychological concepts and research findings effectively to diverse audiences and in teams, demonstrating cultural awareness.

PLO5 develop skills for lifelong learning and professional development by reflecting on personal experiences and integrating new knowledge.

PLO6 apply ethical principles and standards in psychology, based on an awareness and appreciation for ethical standards.

### 1. Compulsory Minor Course (4 credits)

|                             |           |
|-----------------------------|-----------|
| ICSP 113 General Psychology | 4 (4-0-8) |
|-----------------------------|-----------|

### 2. Elective Minor Courses (no less than 16 credits)

|                                            |           |
|--------------------------------------------|-----------|
| ICSP 253 Introduction to Social Psychology | 4 (4-0-8) |
| ICSP 254 Theories of Personality           | 4 (4-0-8) |

|                                                               |           |
|---------------------------------------------------------------|-----------|
| ICSP 255 Introduction to Abnormal Psychology                  | 4 (4-0-8) |
| ICSP 256 Industrial and Organizational Psychology             | 4 (4-0-8) |
| ICSP 257 Educational Psychology                               | 4 (4-0-8) |
| ICSP 258 Cross-Cultural Psychology                            | 4 (4-0-8) |
| ICSP 259 Developmental Psychology                             | 4 (4-0-8) |
| ICSP 260 Psychology of Memory                                 | 4 (4-0-8) |
| ICSP 261 The Psychology of Paranormal Belief                  | 4 (4-0-8) |
| ICSP 262 Coaching Psychology                                  | 4 (4-0-8) |
| ICSP 263 The Science of Happiness and Flourishing             | 4 (4-0-8) |
| ICSP 350 Evolutionary Psychology                              | 4 (4-0-8) |
| ICSP 352 Prosocial and Antisocial Behaviour                   | 4 (4-0-8) |
| ICSP 353 Clinical Psychology                                  | 4 (4-0-8) |
| ICSP 354 Psychological testing                                | 4 (4-0-8) |
| ICSP 357 Psychology of Motivation                             | 4 (4-0-8) |
| ICSP 359 Foundations of Counseling Skills                     | 4 (4-0-8) |
| ICSP 360 Psychology of Marketing and Consumer Behavior        | 4 (4-0-8) |
| ICSP 361 Overcoming Stereotypes, Prejudice and Discrimination | 4 (4-0-8) |
| ICSP 362 The Psychology of Emotional Well-being               | 4 (4-0-8) |

**Note I:** Students who choose the Psychology Minor must register and complete ICSP Introduction to Psychology.

**Note II:** Alternative courses can be substituted to complete the minor if approved by the Program Director and Chair of the division.



**ciences**

# Applied Mathematics

## Minors

- **Minor in Applied Mathematics - for non-Applied Mathematics Program**

To minor in Applied Mathematics, students need to **complete 20 credits** of applied mathematics courses.

**Note:** Ensure that you consult with your academic advisor to select appropriate courses that align with the minor in Applied Mathematics and complement your educational and career goals.

### **Core Minor Courses (12 credits)**

Students must complete 12 credits from the following list of core courses. These courses provide essential knowledge and skills in applied mathematics. If these courses overlap with the students' major courses, they can choose any courses from the Elective Courses for the Minor to fulfill the credit requirement for the Core Minor Courses.

|                                          |           |
|------------------------------------------|-----------|
| ICMA 214 Ordinary Differential Equations | 4 (4-0-8) |
|------------------------------------------|-----------|

*(Prerequisite: ICMA 213 Calculus II)*

|                           |           |
|---------------------------|-----------|
| ICMA 240 Linear Algebra I | 4 (4-0-8) |
|---------------------------|-----------|

|                            |           |
|----------------------------|-----------|
| ICMA 322 Advanced Calculus | 4 (4-0-8) |
|----------------------------|-----------|

*(Prerequisite: ICMA 120 Mathematical Foundations and Proof Techniques)*

### **Elective Courses for the Minor (8 credits)**

Students must complete 8 credits from the following list of elective courses. These courses allow students to explore additional topics and areas of interest within applied mathematics.

|                                                    |           |
|----------------------------------------------------|-----------|
| ICMA 241 Linear Algebra II                         | 4 (4-0-8) |
| ICMA 253 Statistics for Science II                 | 4 (4-0-8) |
| ICMA 313 Number Theory and Cryptography            | 4 (4-0-8) |
| ICMA 316 Graph Theory                              | 4 (4-0-8) |
| ICMA 319 Combinatorics                             | 4 (4-0-8) |
| ICMA 321 Game Theory                               | 4 (4-0-8) |
| ICMA 323 Partial Differential Equations            | 4 (4-0-8) |
| ICMA 335 Complex Variables                         | 4 (4-0-8) |
| ICMA 344 Time Series Analysis                      | 4 (4-0-8) |
| ICMA 346 Optimization                              | 4 (4-0-8) |
| ICMA 350 Probability                               | 4 (4-0-8) |
| ICMA 353 Actuarial Mathematics I                   | 4 (4-0-8) |
| ICMA 354 Actuarial Mathematics II                  | 4 (4-0-8) |
| ICMA 356 Decision Analysis                         | 4 (4-0-8) |
| ICMA 393 Special Topics in Applied Mathematics I   | 4 (4-0-8) |
| ICMA 395 Special Topics in Applied Mathematics II  | 4 (4-0-8) |
| ICMA 410 Stochastic Processes                      | 4 (4-0-8) |
| ICMA 412 Heuristic Optimization                    | 4 (4-0-8) |
| ICMA 424 Abstract Algebra                          | 4 (4-0-8) |
| ICMA 425 Differential Geometry                     | 4 (4-0-8) |
| ICMA 432 Multivariate Analysis                     | 4 (4-0-8) |
| ICMA 435 Regression Analysis                       | 4 (4-0-8) |
| ICMA 450 Mathematical Modeling                     | 4 (4-0-8) |
| ICMA 452 Mathematical Finance and Derivatives      | 4 (4-0-8) |
| ICMA 484 Special Topics in Applied Mathematics III | 4 (4-0-8) |
| ICMA 485 Special Topics in Applied Mathematics IV  | 4 (4-0-8) |
| ICMA 486 Special Topics in Applied Mathematics V   | 4 (4-0-8) |
| ICMA 487 Special Topics in Applied Mathematics VI  | 4 (4-0-8) |

## - Minor in Decision Making

To minor in Decision Making, students need to **complete the following 20 credits** of courses. If these courses overlap with the students' major courses, they can choose any courses from the Major Elective Courses to fulfill the credit requirement for the Minor in Decision Making.

#### Decision Making Minor Courses (20 credits)

|                                       |           |
|---------------------------------------|-----------|
| ICIC 355 Judgment and Decision Making | 4 (4-0-8) |
| ICIC 358 Behavioral Economics         | 4 (4-0-8) |
| ICMA 253 Statistics for Science II    | 4 (4-0-8) |
| ICMA 321 Game Theory                  | 4 (4-0-8) |
| ICMA 356 Decision Analysis            | 4 (4-0-8) |

### ● Minor in Statistics

To minor in Statistics, students need to **complete the following 20 credits** of courses. If these courses overlap with the students' major courses, they can choose from the Major Elective Courses to fulfill the credit requirement for the Minor in Statistics.

#### Statistics Minor Courses (20 credits)

|                                    |           |
|------------------------------------|-----------|
| ICMA 253 Statistics for Science II | 4 (4-0-8) |
| ICMA 344 Time Series Analysis      | 4 (4-0-8) |
| ICMA 350 Probability               | 4 (4-0-8) |
| ICMA 432 Multivariate Analysis     | 4 (4-0-8) |
| ICMA 435 Regression Analysis       | 4 (4-0-8) |

# Certificate

- **Certificate in Actuarial Mathematics**

To earn a Certificate in Actuarial Mathematics, students need to **complete the following 12 credits** of courses. These credits can be in addition to or included in their existing requirements for their respective major(s), minor(s), or certificate(s).

**Actuarial Mathematics Certificate Courses (12 credits)**

|                                             |           |
|---------------------------------------------|-----------|
| ICMA 353 Actuarial Mathematics I            | 4 (4-0-8) |
| ICMA 354 Actuarial Mathematics II           | 4 (4-0-8) |
| ICMB 257 Business Finance for Entrepreneurs | 4 (4-0-8) |

# Biology

# Minors

## Minors for Biological Sciences Program

- **Minor in Bioinformatics**

To minor in Bioinformatics, students are required to **complete at least 20 credits** in addition to their existing requirement(s) for their respective major(s), minor(s) or certificate(s). Minor courses cannot be double counted. The following courses are listed for minoring in Bioinformatics.

|                                                                  |           |
|------------------------------------------------------------------|-----------|
| ICBI 325 Special Topics in Bioinformatics and Molecular Genetics | 4 (4-0-8) |
| ICBI 378 Bioinformatics                                          | 4 (4-0-8) |
| ICBI 379 Introduction to Systems and Structural Biology          | 4 (4-0-8) |
| ICCS 205 Numerical Computation                                   | 4 (4-0-8) |
| ICCS 206 Discrete Mathematics                                    | 4 (4-0-8) |
| ICCS 209 Data Structures                                         | 4 (4-0-8) |
| ICCS 261 Principles of Data Science                              | 4 (4-0-8) |
| ICCS 312 Algorithms and Tractability                             | 4 (4-0-8) |
| ICCS 361 Data Mining                                             | 4 (4-0-8) |
| ICCS 461 Machine Learning                                        | 4 (4-0-8) |

- **Minor in Designing Health Innovation**

To minor in Designing Health Innovation, students are required to complete **FIVE courses** (20 credits) in addition to their existing requirement (s) for their respective major(s), minor(s) or certificate(s).

Minor courses cannot be double counted. Provided that prerequisites are fulfilled, the following courses are compulsory for Designing Health Innovation minor students.

|                                                     |           |
|-----------------------------------------------------|-----------|
| ICBI 416 Community Health Innovation                | 4 (4-0-8) |
| ICBI 417 Design Thinking in Health Innovation       | 4 (4-0-8) |
| ICBI 418 Case Studies in Health Innovation          | 4 (4-0-8) |
| ICBI 419 Cutting-Edge Technology for Biodesign      | 4 (2-4-6) |
| ICBI 420 Entrepreneurship and Innovation in Science | 4 (4-0-8) |

## ● Minor in Ecology and Biodiversity

To minor in Ecology and Biodiversity, students are required to **complete at least 20 credits** in addition to their existing requirement(s). Minor courses cannot be double counted. The following courses are listed for minoring in Ecology and Biodiversity. Students must complete ICBI 383 in this minor. Students are recommended to take either pair of the three combinations ICBI 385 & ICBI 386, ICBI 387 & ICBI 388, OR ICBI 440 & ICBI 442.

### Required course in Ecology and Biodiversity Minor

|                                              |           |
|----------------------------------------------|-----------|
| ICBI 383 Systematic Biology and Biodiversity | 2 (2-0-4) |
|----------------------------------------------|-----------|

Students can then select the remaining credits from the following courses:

|                                                                   |           |
|-------------------------------------------------------------------|-----------|
| ICBI 232 Comparative anatomy and physiology of animals and plants | 4 (3-2-7) |
| ICBI 329 Animal and Plant Behavior                                | 4 (4-0-8) |
| ICBI 381 Evolutionary Biology                                     | 4 (4-0-8) |
| ICBI 385 Freshwater Ecology and Conservation                      | 4 (4-0-8) |
| ICBI 386 Practical Freshwater Ecology and Conservation            | 2 (0-4-2) |
| ICBI 387 Terrestrial Ecology and Conservation                     | 4 (4-0-8) |
| ICBI 388 Practical Terrestrial Ecology and Conservation           | 2 (0-4-2) |
| ICBI 389 Infectious Disease Ecology                               | 4 (4-0-8) |
| ICBI 422 Insects Biology and Ecology                              | 4 (3-2-7) |
| ICBI 443 Fungal Ecology                                           | 4 (3-2-7) |
| ICBI 440 Marine Ecology and Conservation                          | 4 (4-0-8) |
| ICBI 442 Practical Marine Ecology and Conservation                | 2 (0-4-2) |

# Minors for non-Biological Sciences Program

## ● Minor in Biological Sciences

To minor in Biological Sciences, students need to **complete at least 20 credits** of courses in biological sciences in addition to their existing requirement (s) for their respective major(s), minor(s) or certificate(s). Minor courses cannot be double counted.

The following TWO courses are compulsory for all non-biological sciences students.

|                                    |           |
|------------------------------------|-----------|
| ICBI 105 Molecules to Living Cells | 4 (2-4-6) |
| ICBI 106 Organisms to Ecosystems   | 2 (2-0-4) |

Provided that prerequisites are fulfilled, the following courses are recommended for Biological Sciences minor students or other ICBI courses approved by the Program Director of Biological Sciences. General education courses cannot be counted towards a minor in Biological Sciences.

|                                                                   |           |
|-------------------------------------------------------------------|-----------|
| ICBI 110 Quantitative Reasoning in Biological Sciences            | 4 (4-0-8) |
| ICBI 213 Genetics                                                 | 4 (4-0-8) |
| ICBI 214 General Microbiology                                     | 4 (4-0-8) |
| ICBI 218 Cellular Systems                                         | 4 (4-0-8) |
| ICCH 231 Biochemistry                                             | 4 (4-0-8) |
| ICBI 232 Comparative Anatomy and Physiology of Animals and Plants | 4 (3-2-7) |
| ICBI 263 Practical Sustainability and Biodiversity                | 4 (2-4-6) |
| ICBI 302 Mechanisms of Gene Expression                            | 2 (2-0-4) |
| ICBI 303 Basic Immunology                                         | 4 (4-0-8) |
| ICBI 305 Techniques in Molecular Science                          | 4 (2-4-6) |
| ICBI 314 Genetics of Bacteria and Viruses                         | 2 (2-0-4) |
| ICBI 329 Animal and Plant Behavior                                | 4 (4-0-8) |

## ● Minor in Designing Health Innovation

To minor in Designing Health Innovation, students are required to complete **FIVE courses** (20 credits) in addition to their existing requirement (s) for their respective major(s), minor(s) or certificate(s). Minor courses cannot be double counted. Provided that prerequisites are fulfilled, the following courses are compulsory for Designing Health Innovation minor students.

|                                                                                        |           |
|----------------------------------------------------------------------------------------|-----------|
| ICBI 416 Community Health Innovation                                                   | 4 (4-0-8) |
| ICBI 417 Design Thinking in Health Innovation <b>OR</b> ICBI 463 From Ideas to Actions | 4 (4-0-8) |
| ICBI 418 Case Studies in Health Innovation                                             | 4 (4-0-8) |
| ICBI 419 Cutting-Edge Technology for Biodesign                                         | 4 (2-4-6) |
| ICBI 420 Entrepreneurship and Innovation in Science                                    | 4 (4-0-8) |

## ● Minor in Ecology and Biodiversity

To minor in Ecology and Biodiversity for non-biological sciences major students, students need to **complete at least 20 credits** of courses in the Ecology and Biodiversity minor in addition to their existing requirement (s) for their respective major(s), minor(s) or certificate(s). Minor courses cannot be double counted.

**The following THREE courses are compulsory for all non-biological sciences students, who seek to acquire an Ecology and Biodiversity minor.**

|                                                    |           |
|----------------------------------------------------|-----------|
| ICBI 105 Molecules to Living Cells                 | 4 (2-4-6) |
| ICBI 106 Organisms to Ecosystems                   | 2 (2-0-4) |
| ICBI 263 Practical Sustainability and Biodiversity | 4 (2-4-6) |

**Students can then select to enroll their remaining 10 credits from the following courses.**

|                                                                   |           |
|-------------------------------------------------------------------|-----------|
| ICBI 232 Comparative anatomy and physiology of animals and plants | 4 (3-2-7) |
| ICBI 329 Animal and Plant Behavior                                | 4 (4-0-8) |
| ICBI 383 Systematic Biology and Biodiversity                      | 2 (2-0-4) |
| ICBI 385 Freshwater Ecology and Conservation                      | 4 (4-0-8) |
| ICBI 386 Practical Freshwater Ecology and Conservation            | 2 (0-4-2) |
| ICBI 387 Terrestrial Ecology and Conservation                     | 4 (4-0-8) |
| ICBI 388 Practical Terrestrial Ecology and Conservation           | 2 (0-4-2) |
| ICBI 389 Infectious Disease Ecology                               | 4 (4-0-8) |
| ICBI 422 Insects Biology and Ecology                              | 4 (3-2-7) |
| ICBI 440 Marine Ecology and Conservation                          | 4 (4-0-8) |
| ICBI 442 Practical Marine Ecology and Conservation                | 2 (0-4-2) |

# Certificate

- **Certificate in Biological Sciences - for non-Biological Sciences**

## Program

Students who want to pursue a certificate in Biological Sciences need to **complete at least 12 credits** of biological sciences courses, in addition to their existing requirement (s) for their respective major(s), minor(s) or certificate(s). Certificate courses cannot be double counted. The list of available courses is listed below. Other ICBI courses can be counted for completing this certificate as approved by the Program Director of Biological Sciences.

|                                                                   |           |
|-------------------------------------------------------------------|-----------|
| ICBI 105 Molecules to Living Cells                                | 4 (2-4-6) |
| ICBI 106 Organisms to Ecosystems                                  | 2 (2-0-4) |
| ICBI 110 Quantitative Reasoning in Biological Sciences            | 4 (4-0-8) |
| ICBI 213 Genetics                                                 | 4 (4-0-8) |
| ICBI 214 General Microbiology                                     | 4 (4-0-8) |
| ICBI 218 Cellular Systems                                         | 4 (4-0-8) |
| ICCH 231 Biochemistry                                             | 4 (4-0-8) |
| ICBI 232 Comparative Anatomy and Physiology of Animals and Plants | 4 (3-2-7) |
| ICBI 263 Practical Sustainability and Biodiversity                | 4 (2-4-6) |
| ICBI 302 Mechanisms of Gene Expression                            | 2 (2-0-4) |
| ICBI 303 Basic Immunology                                         | 4 (4-0-8) |
| ICBI 314 Genetics of Bacteria and Viruses                         | 2 (2-0-4) |
| ICBI 329 Animal and Plant Behavior                                | 4 (4-0-8) |
| ICBI 350 Techniques in Molecular Science                          | 4 (2-4-6) |

# Chemistry

## Minor

- **Minor in Chemistry - for non-Chemistry Program**

To minor in Chemistry, students need to **complete at least 20 credits** of chemistry courses in addition to their existing requirement (s) for their respective major(s), minor(s) or certificate(s). Minor courses cannot be double counted.

**The following courses are compulsory for all chemistry minor students.**

|                                             |           |
|---------------------------------------------|-----------|
| ICCH 101 General Chemistry I                | 4 (4-0-8) |
| ICCH 102 General Chemistry II               | 4 (4-0-8) |
| ICCH 103 Integrated Laboratory in Chemistry | 2 (0-4-2) |

**Provided that prerequisites are fulfilled, the following courses are recommended for Chemistry minor students.**

|                                                         |           |
|---------------------------------------------------------|-----------|
| ICCH 100 Chemistry and Careers                          | 1 (1-0-2) |
| ICCH 221 Organic Chemistry I                            | 4 (4-0-8) |
| ICCH 222 Organic Chemistry II                           | 4 (4-0-8) |
| ICCH 224 Organic Chemistry Laboratory                   | 2 (0-4-2) |
| ICCH 231 Biochemistry                                   | 4 (4-0-8) |
| ICCH 232 Biochemistry Laboratory                        | 2 (0-4-2) |
| ICCH 261 Analytical Chemistry and Instrumental Analysis | 4 (4-0-8) |
| ICCH 262 Analytical Chemistry Laboratory                | 2 (0-4-2) |
| ICCH 321 Chemical Spectroscopy                          | 4 (4-0-8) |
| ICCH 322 Polymer Science and Technology                 | 2 (2-0-4) |
| ICCH 363 Physical Chemistry A                           | 4 (4-0-8) |

|                                                    |            |
|----------------------------------------------------|------------|
| ICCH 364 Physical Chemistry B                      | 4 (4-0-8)  |
| ICCH 365 Physical Chemistry Laboratory             | 2 (0-4-2)  |
| ICCH 391 Inorganic Chemistry A                     | 4 (4-0-8)  |
| ICCH 392 Inorganic Chemistry B                     | 4 (4-0-8)  |
| ICCH 393 Inorganic Chemistry Laboratory            | 2 (0-4-2)  |
| ICCH 471 Chemical Unknown Detective                | 2 (0-4-2)  |
| ICCH 402 Undergraduate Thesis                      | 6 (0-12-6) |
| ICCH 403 Field Study A                             | 1 (0-3-1)  |
| ICCH 404 Field Study B                             | 1 (0-3-1)  |
| ICCH 451 Advanced Organic Chemistry                | 2 (2-0-4)  |
| ICCH 452 Materials Science                         | 2 (2-0-4)  |
| ICCH 453 Computational Chemistry                   | 2 (2-0-4)  |
| ICCH 454 Biophysical Chemistry                     | 2 (2-0-4)  |
| ICCH 455 Advanced Inorganic Chemistry              | 2 (2-0-4)  |
| ICCH 456 Chemistry Innovation and Entrepreneurship | 2 (2-0-4)  |
| ICCH 457 Advanced Analytical Chemistry             | 2 (2-0-4)  |
| ICCH 458 Bioinorganic Chemistry                    | 2 (2-0-4)  |
| ICCH 459 Supramolecular Chemistry                  | 2 (2-0-4)  |
| ICCH 460 Petroleum and Petrochemical Industry      | 2 (2-0-4)  |

or other ICCH courses approved by the PD on a case-by-case basis. ICCH 190, ICCH 191, ICCH 192, ICCH193 and other general education chemistry courses cannot be counted towards a minor in chemistry.

# Certificates

- **Certificate in Chemistry - for non-Chemistry Program**

Students who want to pursue a certificate in chemistry need to **complete at least 12 credits** of chemistry courses, in addition to their existing requirement (s) for their respective major(s), minor(s) or certificate(s). Certificate courses cannot be double counted. The list of available courses is listed below (same with minor).

|                                                         |            |
|---------------------------------------------------------|------------|
| ICCH 101 General Chemistry I                            | 4 (4-0-8)  |
| ICCH 102 General Chemistry II                           | 4 (4-0-8)  |
| ICCH 103 Integrated Laboratory in Chemistry             | 2 (0-4-2)  |
| ICCH 100 Chemistry and Careers                          | 1 (1-0-2)  |
| ICCH 221 Organic Chemistry I                            | 4 (4-0-8)  |
| ICCH 222 Organic Chemistry II                           | 4 (4-0-8)  |
| ICCH 224 Organic Chemistry Laboratory                   | 2 (0-4-2)  |
| ICCH 231 Biochemistry                                   | 4 (4-0-8)  |
| ICCH 232 Biochemistry Laboratory                        | 2 (0-4-2)  |
| ICCH 261 Analytical Chemistry and Instrumental Analysis | 4 (4-0-8)  |
| ICCH 262 Analytical Chemistry Laboratory                | 2 (0-4-2)  |
| ICCH 321 Chemical Spectroscopy                          | 4 (4-0-8)  |
| ICCH 322 Polymer Science and Technology                 | 2 (2-0-4)  |
| ICCH 363 Physical Chemistry A                           | 4 (4-0-8)  |
| ICCH 364 Physical Chemistry B                           | 4 (4-0-8)  |
| ICCH 365 Physical Chemistry Laboratory                  | 2 (0-4-2)  |
| ICCH 391 Inorganic Chemistry A                          | 4 (4-0-8)  |
| ICCH 392 Inorganic Chemistry B                          | 4 (4-0-8)  |
| ICCH 393 Inorganic Chemistry Laboratory                 | 2 (0-4-2)  |
| ICCH 471 Chemical Unknown Detective                     | 2 (0-4-2)  |
| ICCH 402 Undergraduate Thesis                           | 6 (0-12-6) |
| ICCH 403 Field Study A                                  | 1 (0-3-1)  |

|                                                    |           |
|----------------------------------------------------|-----------|
| ICCH 404 Field Study B                             | 1 (0-3-1) |
| ICCH 451 Advanced Organic Chemistry                | 2 (2-0-4) |
| ICCH 452 Materials Science                         | 2 (2-0-4) |
| ICCH 453 Computational Chemistry                   | 2 (2-0-4) |
| ICCH 454 Biophysical Chemistry                     | 2 (2-0-4) |
| ICCH 455 Advanced Inorganic Chemistry              | 2 (2-0-4) |
| ICCH 456 Chemistry Innovation and Entrepreneurship | 2 (2-0-4) |
| ICCH 457 Advanced Analytical Chemistry             | 2 (2-0-4) |
| ICCH 458 Bioinorganic Chemistry                    | 2 (2-0-4) |
| ICCH 459 Supramolecular Chemistry                  | 2 (2-0-4) |
| ICCH 460 Petroleum and Petrochemical Industry      | 2 (2-0-4) |

The following courses are recommended for non-Science students who want to pursue a certificate in Chemistry:

|                                                    |           |
|----------------------------------------------------|-----------|
| ICCH 100 Chemistry and Careers                     | 1 (1-0-2) |
| ICCH 101 General Chemistry I                       | 4 (4-0-8) |
| ICCH 102 General Chemistry II                      | 4 (4-0-8) |
| ICCH 103 Integrated Laboratory in Chemistry        | 2 (0-4-2) |
| ICCH 403 Field Study A                             | 1 (0-3-1) |
| ICCH 404 Field Study B                             | 1 (0-3-1) |
| ICCH 456 Chemistry Innovation and Entrepreneurship | 2 (2-0-4) |

### ● Certificate in Organic Chemistry - for non-Chemistry Program

To obtain a certificate in Organic Chemistry, students need to **complete 12 credits** of the following courses in the field of organic chemistry, in addition to their existing requirement (s) for their respective major(s), minor(s) or certificate(s). Certificate courses cannot be double counted.

|                                         |           |
|-----------------------------------------|-----------|
| ICCH 222 Organic Chemistry II           | 4 (4-0-8) |
| ICCH 224 Organic Chemistry Laboratory   | 2 (0-4-2) |
| ICCH 321 Chemical Spectroscopy          | 4 (4-0-8) |
| ICCH 322 Polymer Science and Technology | 2 (2-0-4) |
| ICCH 451 Advanced Organic Chemistry     | 2 (2-0-4) |

# Computer Science

## Minors

The computer science program offers the following minors to students majoring in another degree program: Computer Science, Applied Data Science, and Web/Mobile Developer. To obtain a minor, the students must complete **FIVE courses** as specified.

- **Minor in Applied Data Science - for non-Computer Science Program**

|                                       |           |
|---------------------------------------|-----------|
| ICCS 102 Coding for All               | 4 (4-0-8) |
| ICCS 111 Programming and Abstractions | 4 (4-0-8) |
| ICCS 206 Discrete Mathematics         | 4 (4-0-8) |
| ICCS 209 Data Structures              | 4 (4-0-8) |
| ICCS 261 Principles of Data Science   | 4 (4-0-8) |

- **Minor in Computer Science - for non-Computer Science Program**

|                                                                      |           |
|----------------------------------------------------------------------|-----------|
| ICCS 102 Coding for All                                              | 4 (4-0-8) |
| ICCS 111 Programming and Abstractions                                | 4 (4-0-8) |
| ICCS 206 Discrete Mathematics                                        | 4 (4-0-8) |
| ICCS 209 Data Structures                                             | 4 (4-0-8) |
| ICCS XXX Any Computer Science course with code 200 and up 4 (x-x-x): |           |
| ICCS 205 Numerical Computation                                       | 4 (4-0-8) |

|                                                            |            |
|------------------------------------------------------------|------------|
| ICCS 225 Database Foundations                              | 4 (4-0-8)  |
| ICCS 227 Principles of Computer Systems and Architecture   | 4 (4-0-8)  |
| ICCS 261 Principles of Data Science                        | 4 (4-0-8)  |
| ICCS 271 Interaction Design                                | 4 (4-0-8)  |
| ICCS 302 Human Computer Interaction and Visualization      | 4 (4-0-8)  |
| ICCS 303 Competitive Programming                           | 4 (4-0-8)  |
| ICCS 309 Scientific Research and Presentations             | 4 (4-0-8)  |
| ICCS 311 Functional and Parallel Programming               | 4 (4-0-8)  |
| ICCS 312 Algorithms and Tractability                       | 4 (4-0-8)  |
| ICCS 315 Applied Algorithms                                | 4 (4-0-8)  |
| ICCS 320 Computer Networks                                 | 4 (4-0-8)  |
| ICCS 322 Operating Systems Design and Implementation       | 4 (4-0-8)  |
| ICCS 323 IoT Electronics                                   | 4 (4-0-8)  |
| ICCS 324 Computer Architecture                             | 4 (4-0-8)  |
| ICCS 340 Web Application Development                       | 4 (4-0-8)  |
| ICCS 362 Data Engineering                                  | 4 (4-0-8)  |
| ICCS 371 Scalable Systems                                  | 4 (4-0-8)  |
| ICCS 372 Software Engineering                              | 4 (4-0-8)  |
| ICCS 373 Cloud Computing                                   | 4 (4-0-8)  |
| ICCS 402 Senior Project in Computer Science I              | 4 (0-8-4)  |
| ICCS 403 Senior Project in Computer Science II             | 4 (0-8-4)  |
| ICCS 404 Computer Graphics and Augmented Reality           | 4 (4-0-8)  |
| ICCS 412 Topics in Theory I                                | 4 (4-0-8)  |
| ICCS 413 Topics in Theory II                               | 4 (4-0-8)  |
| ICCS 414 Topics in Theory III                              | 4 (4-0-8)  |
| ICCS 418 Computer System Security                          | 4 (4-0-8)  |
| ICCS 423 Topics in Systems I                               | 4 (4-0-8)  |
| ICCS 424 Topics in Systems II                              | 4 (4-0-8)  |
| ICCS 425 Topics in Systems III                             | 4 (4-0-8)  |
| ICCS 431 Cooperative and Work integrated Education Seminar | 2 (2-0-4)  |
| ICCS 432 Cooperative and Work integrated Education I       | 3 (0-40-8) |
| ICCS 433 Cooperative and Work integrated Education II      | 3 (0-40-8) |
| ICCS 445 E-Commerce Innovation and Technology Management   | 4 (4-0-8)  |
| ICCS 448 Mobile Application Programming                    | 4 (4-0-8)  |

|                                                 |           |
|-------------------------------------------------|-----------|
| ICCS 461 Machine Learning                       | 4 (4-0-8) |
| ICCS 462 Deep Learning                          | 4 (4-0-8) |
| ICCS 463 Special Topics in Machine Learning I   | 4 (4-0-8) |
| ICCS 464 Special Topics in Machine Learning II  | 4 (4-0-8) |
| ICCS 465 Special Topics in Machine Learning III | 4 (4-0-8) |
| ICCS 370 Software System Construction           | 4 (4-0-8) |
| ICCS 471 Topics in Software Technology I        | 4 (4-0-8) |
| ICCS 472 Topics in Software Technology II       | 4 (4-0-8) |
| ICCS 473 Topics in Software Technology III      | 4 (4-0-8) |
| ICCS 491 Topics in Computer Science I           | 4 (4-0-8) |
| ICCS 492 Topics in Computer Science II          | 4 (4-0-8) |

● **Minor in Web/Mobile Developer - for non-Computer Science Program**

|                                                                                        |           |
|----------------------------------------------------------------------------------------|-----------|
| ICCS 111 Programming and Abstractions                                                  | 4 (4-0-8) |
| ICCS 206 Discrete Mathematics                                                          | 4 (4-0-8) |
| ICCS 209 Data Structures                                                               | 4 (4-0-8) |
| ICCS 370 Software System Construction                                                  | 4 (4-0-8) |
| ICCS 340 Web Application Development <u>OR</u> ICCS 448 Mobile Application Programming | 4 (4-0-8) |

# Certificates

- **Certificates in Computer Science - for non-Computer Science Program**

Students from majors other than Computer Science can choose to complete any Computer Science certificates as listed in the Computer Science I-Design section with the additional of the following certificate:

## **Computer Science Foundation**

|                                       |           |
|---------------------------------------|-----------|
| ICCS 111 Programming and Abstractions | 4 (4-0-8) |
| ICCS 209 Data Structures              | 4 (4-0-8) |
| ICCS 206 Discrete Mathematics         | 4 (4-0-8) |

- **Certificates in AI and Analytics**

|                                                            |           |
|------------------------------------------------------------|-----------|
| ICCS 362 Data Engineering                                  | 4 (4-0-8) |
| ICCS 371 Scalable Systems                                  | 4 (4-0-8) |
| ICCS 461 Machine Learning <u>OR</u> ICCS 462 Deep Learning | 4 (4-0-8) |

- **Certificates in Software Platform Engineering**

|                                                                                               |           |
|-----------------------------------------------------------------------------------------------|-----------|
| ICCS 320 Computer Networks                                                                    | 4 (4-0-8) |
| ICCS 322 Operating Systems Design and Implementation <u>OR</u> ICCS 324 Computer Architecture | 4 (4-0-8) |
| ICCS 371 Scalable Systems                                                                     | 4 (4-0-8) |

- **Certificates in UX, UI, and How to Make It Work**

ICCD 119 2D Design Principles 4 (2-4-6)

ICCS 302 Human Computer Interaction and Visualization 4 (4-0-8)

ICCS 340 Web Application Development OR ICCS 448 Mobile Application Programming 4 (4-0-8)

# Food Science and Technology

## Certificates

- **Certificate in Culinary Science**

This certificate is aimed to offer to students who are interested in culinary product development for food business through an integration of culinary arts and scientific principles. Students will gain knowledge and skills to innovate culinary products through a mix of theory and hand-on practice. Students must complete these following courses (12 credits):

|                                                          |           |
|----------------------------------------------------------|-----------|
| ICFS 171 Discovering Culinary Techniques                 | 4 (2-4-6) |
| ICFS 172 World Cuisines                                  | 4 (2-4-6) |
| ICFS 374 Experimental Design in Food Product Development | 2 (1-2-3) |
| ICFS 114 Marketing of Food Product and Services          | 2 (2-0-4) |

- **Certificate in Food Innovation and Design**

This certificate is aimed to offer to students who are interested in innovation of food product. Students will gain knowledge on developing innovative food product, processing technologies, food quality, safety, and marketing of food products and service industries. Students must complete these following courses (12 credits):

|                                                                                                                              |           |
|------------------------------------------------------------------------------------------------------------------------------|-----------|
| ICFS 114 Marketing of Food Product and Services                                                                              | 2 (2-0-4) |
| ICFS 119 Quality System in Food Processing <b>OR</b> ICFS 366 Consultancy and Auditing in Food Quality and Safety Management | 4 (4-0-8) |
| ICFS 121 Food Product Innovation                                                                                             | 4 (4-0-8) |
| Any 2 credits or 4 credits course from major electives in Food Science and Technology:                                       |           |
| ICBI 407 Occupational Health and Safety                                                                                      | 4 (4-0-8) |
| ICBI 420 Entrepreneurship and Innovation in Science                                                                          | 4 (4-0-8) |
| ICFS 114 Marketing of Food Product and Services                                                                              | 2 (2-0-4) |
| ICFS 115 Operations Management in Food Business                                                                              | 2 (2-0-4) |
| ICFS 116 Food for Specialised Diets                                                                                          | 4 (3-2-7) |
| ICFS 117 Food Product and Process Design                                                                                     | 4 (4-0-8) |
| ICFS 118 Food Safety and Sanitation Management                                                                               | 4 (4-0-8) |
| ICFS 119 Quality System in Food Processing                                                                                   | 4 (4-0-8) |
| ICFS 120 Science of Thai Culinary Arts                                                                                       | 4 (3-2-7) |
| ICFS 121 Food Product Innovation                                                                                             | 4 (4-0-8) |
| ICFS 122 Trends in Food Science and Technology                                                                               | 2 (2-0-4) |
| ICFS 171 Discovering Culinary Techniques                                                                                     | 4 (2-4-6) |
| ICFS 172 World Cuisine                                                                                                       | 4 (2-4-6) |
| ICFS 366 Consultancy and Auditing in Food Quality and Safety Management                                                      | 4 (4-0-8) |
| ICFS 374 Experimental Design in Food Product Development                                                                     | 2 (1-2-3) |

# Physics

## Minor

- **Minor in Physics - for non-Physics Program**

To minor in Physics (at least 20 credits), students need to complete 12 credits of the mandatory courses, and 8 or more from the list of minor elective courses. The prerequisites for these courses cannot be counted as Minor in physics.

**Mandatory courses for Minor in Physics (12 credits)**

|                                        |           |
|----------------------------------------|-----------|
| ICPY 251 Mechanics I                   | 4 (4-0-8) |
| ICPY 291 Introductory Electromagnetism | 4 (4-0-8) |
| ICPY 361 Quantum Mechanics I           | 4 (4-0-8) |

**The other elective courses to complete minor in Physics must be taken from other ICPY courses listed in Physics major required courses or Physics major elective courses:**

|                                               |           |
|-----------------------------------------------|-----------|
| ICPY 251 Mechanics I                          | 4 (4-0-8) |
| ICPY 291 Introductory Electromagnetism        | 4 (4-0-8) |
| ICPY 334 Numerical Methods                    | 4 (4-0-8) |
| ICPY 342 Integrated Laboratory in Physics II  | 2 (0-4-2) |
| ICPY 343 Integrated Laboratory in Physics III | 2 (0-4-2) |
| ICPY 351 Mechanics II                         | 4 (4-0-8) |
| ICPY 361 Quantum Mechanics I                  | 4 (4-0-8) |
| ICPY 391 Electrodynamics and Optics           | 4 (4-0-8) |
| ICPY 452 Statistical Mechanics                | 4 (4-0-8) |
| ICPY 461 Quantum Mechanics II                 | 4 (4-0-8) |

|                                                  |           |
|--------------------------------------------------|-----------|
| ICPY 271 Mathematical Methods in Physics         | 4 (4-0-8) |
| ICPY 355 Special Topics in Physics I             | 4 (4-0-8) |
| ICPY 356 Special Topics in Physics II            | 4 (4-0-8) |
| ICPY 357 Special Topics in Laboratory Physics I  | 4 (3-2-7) |
| ICPY 371 Thermal Physics                         | 4 (4-0-8) |
| ICPY 455 Special Topics in Physics III           | 4 (4-0-8) |
| ICPY 456 Special Topics in Physics IV            | 4 (4-0-8) |
| ICPY 457 Special Topics in Laboratory Physics II | 4 (3-2-7) |
| ICPY 471 Atomic and Molecular Physics            | 4 (4-0-8) |
| ICPY 472 Solid State Physics                     | 4 (4-0-8) |
| ICPY 473 Nuclear Physics                         | 4 (4-0-8) |
| ICPY 474 Astrophysics                            | 4 (4-0-8) |
| ICPY 475 Plasma Physics                          | 4 (4-0-8) |
| ICPY 484 Cosmology                               | 4 (4-0-8) |
| ICPY 486 Observational Astronomy                 | 4 (4-0-8) |
| ICPY 487 Data Analysis in Astronomy              | 4 (4-0-8) |
| ICPY 488 Special Topics in Astronomy             | 4 (4-0-8) |
| ICPY 490 Computational Physics                   | 4 (4-0-8) |
| ICPY 492 Electronics                             | 4 (4-0-8) |
| ICPY 496 Biophysics                              | 4 (4-0-8) |

**Except the following:**

ICPY 309 Scientific Research and Presentation

ICPY 441 Senior project in Physics

For example, ICPY 102 Physics II, cannot fulfil the minor because it is not listed in the major required or major elective course. ICCS 206 Discrete Mathematics, which is listed in the major elective course, cannot fulfill the minor requirement because the course code is not ICPY.



**ourism**



**and**

**ospitality**

# Travel and Service Business Entrepreneurship

## Minors

- **Minor in Events Management, Design and Production**

To minor in Events Management, Design and Production, students need to complete minimum 20 credits comprising the compulsory **FIVE subjects** as follows:

|                                                 |           |
|-------------------------------------------------|-----------|
| ICCD 111 Research & Conceptual Development      | 4 (2-4-6) |
| ICTB 251 Event Planning and Operation           | 4 (4-0-8) |
| ICTB 252 Event and Experience Design            | 4 (3-2-7) |
| ICTB 253 Event Business Stakeholders Engagement | 4 (4-0-8) |
| ICTB 355 Creative Event Production              | 4 (3-2-7) |

All courses required for this minor can only be counted in the I-Design elective course category and cannot be double-counted in other course categories.

- **Minor in Food Service and Wine Business**

To minor in Food Service and Wine Business, students need to complete minimum 20 credits comprising the compulsory **FIVE subjects** as follows:

|                                                                                                  |           |
|--------------------------------------------------------------------------------------------------|-----------|
| ICTB 231 Culinary Operation Management <b>OR</b> ICTB 232 Baking and Pastry Business             | 4 (3-2-7) |
| ICFS 121 Food Product Innovation <b>OR</b> ICTB 234 Restaurant Marketing and Branding Strategies | 4 (4-0-8) |

|                                                      |           |
|------------------------------------------------------|-----------|
| ICTB 244 Wine Studies and Wine Tourism               | 4 (3-2-7) |
| ICFS 118 Food Safety and Sanitation Management       | 4 (4-0-8) |
| ICTB 335 Restaurant Business Planning and Operations | 4 (4-0-8) |

All courses required for this minor can only be counted in the I-Design elective course category and cannot be double-counted in other course categories.

## ● Minor in Hospitality Design Perspectives

To minor in Hospitality Design Perspectives, students need to complete minimum 20 credits comprising the compulsory **FIVE subjects** as follows:

|                                              |           |
|----------------------------------------------|-----------|
| ICCD 114 2 Dimensional Design & Color Theory | 4 (2-4-6) |
| ICCD 116 Digital Images and Processes        | 4 (2-4-6) |
| ICTB 221 Room Division Operation Management  | 4 (4-0-8) |
| ICTB 231 Culinary Operation Management       | 4 (3-2-7) |
| ICTB 223 Hospitality Facilities Design       | 4 (3-2-7) |

All courses required for this minor can only be counted in the I-Design elective course category and cannot be double-counted in other course categories.

## ● Minor in Medical Wellness Business

To minor in Medical Wellness Business Minor, students need to complete minimum 20 credits comprising the compulsory **FIVE subjects** as follows:

|                                                      |           |
|------------------------------------------------------|-----------|
| ICTB 261 The Basics of Exercise Science and Wellness | 4 (4-0-8) |
| ICTB 263 Healthcare and Medical Business             | 4 (4-0-8) |
| ICTB 364 Spa and Wellness Business                   | 4 (4-0-8) |
| ICBI 417 Design Thinking in Health innovation        | 4 (4-0-8) |
| ICBI 420 Entrepreneurship and Innovation in Science  | 4 (4-0-8) |

All courses required for this minor can only be counted in the I-Design elective course category and cannot be double-counted in other course categories.

## ● Minor in Travel Experience Design and Storytelling

To minor in Travel Experience Design and Storytelling, students need to complete minimum 20 credits comprising the compulsory **FIVE subjects** as follows:

|                                                        |           |
|--------------------------------------------------------|-----------|
| ICMC 209 Creativity and Communication                  | 4 (4-0-8) |
| ICMC 208 Transmedia and Storytelling                   | 4 (4-0-8) |
| ICTB 233 Gastronomy Exploration and Food's Experiences | 4 (4-0-8) |
| ICTB 241 Travel Guide and Interpretation               | 4 (3-2-7) |
| ICTB 242 Tourism Package Management and Business       | 4 (3-2-7) |

All courses required for this minor can only be counted in the I-Design elective course category and cannot be double-counted in other course categories.

## ● Minor in Travel and Service Business Entrepreneurship – for non-Travel and Service Business Entrepreneurship Program

To minor in Travel and Service Business Entrepreneurship, students need to **complete minimum 20 credits** comprising the compulsory subjects (3 subjects) and elective subjects (2 subjects)

### Compulsory subjects (12 credits)

|                                                         |           |
|---------------------------------------------------------|-----------|
| ICTB 219 Introduction to Travel and Service Businesses  | 4 (4-0-8) |
| ICTB 304 Service Management and experience design       | 4 (4-0-8) |
| ICTB 315 Entrepreneurship and Business Plan Development | 4 (4-0-8) |

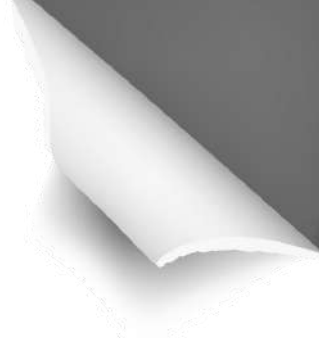
### Elective subjects (8 credits)

Students can choose **TWO subjects** (based on the availability of the course) from the THM curriculum, **EXCEPT the Internship courses:**

|                                                              |           |
|--------------------------------------------------------------|-----------|
| ICTB 202 Principles of Management                            | 4 (4-0-8) |
| ICTB 203 Consumer Behavior for Travel and Service Businesses | 4 (4-0-8) |
| ICTB 204 Business Communication                              | 4 (4-0-8) |
| ICTB 212 Marketing for Travel and Service Businesses         | 4 (4-0-8) |
| ICTB 213 Economics for Travel and Service Businesses         | 4 (4-0-8) |
| ICTB 214 Accounting for Travel and Service Businesses        | 4 (4-0-8) |

|                                                                                |           |
|--------------------------------------------------------------------------------|-----------|
| ICTB 216 Sustainable Development in Travel and Service Businesses              | 4 (4-0-8) |
| ICTB 217 Digital Marketing for Travel and Service Businesses                   | 4 (4-0-8) |
| ICTB 218 Business Statistics and Data Management                               | 4 (4-0-8) |
| ICTB 221 Room Division Operation Management                                    | 4 (4-0-8) |
| ICTB 222 Facility Management for Hotel Operations                              | 4 (4-0-8) |
| ICTB 223 Hospitality Facilities Design                                         | 4 (3-2-7) |
| ICTB 224 Special Topics in Hotel Management                                    | 4 (4-0-8) |
| ICTB 231 Culinary Operation Management                                         | 4 (3-2-7) |
| ICTB 232 Baking and Pastry Business                                            | 4 (3-2-7) |
| ICTB 233 Gastronomy Exploration and Food's Experiences                         | 4 (4-0-8) |
| ICTB 234 Restaurant Marketing and Branding Strategies                          | 4 (4-0-8) |
| ICTB 235 Special Topics in Food & Restaurant Management                        | 4 (4-0-8) |
| ICTB 241 Travel Guide and Interpretation                                       | 4 (3-2-7) |
| ICTB 242 Tourism Package Management and Business                               | 4 (3-2-7) |
| ICTB 243 Online Travel and Service Business                                    | 4 (4-0-8) |
| ICTB 244 Wine Studies and Wine Tourism                                         | 4 (3-2-7) |
| ICTB 245 Cultural Heritage Studies for Entrepreneurship                        | 4 (4-0-8) |
| ICTB 246 Special Topics in Tourism Management                                  | 4 (4-0-8) |
| ICTB 251 Event Planning and Operation                                          | 4 (4-0-8) |
| ICTB 252 Event and Experience Design                                           | 4 (3-2-7) |
| ICTB 253 Event Business Stakeholders Engagement                                | 4 (4-0-8) |
| ICTB 254 Leisure and Sport Event                                               | 4 (3-2-7) |
| ICTB 255 Special Topics in Event Management                                    | 4 (4-0-8) |
| ICTB 261 The Basics of Exercise Science and Wellness                           | 4 (4-0-8) |
| ICTB 262 Principles and Practice of Sport management for Business              | 4 (4-0-8) |
| ICTB 263 Healthcare and Medical Business                                       | 4 (4-0-8) |
| ICTB 264 Special Topics in Health & Wellness Management                        | 4 (4-0-8) |
| ICTB 301 People and Talent Management                                          | 4 (4-0-8) |
| ICTB 302 Business Laws for Travel and Service Businesses                       | 4 (4-0-8) |
| ICTB 303 Digital Transformation for Travel and Service Businesses              | 4 (4-0-8) |
| ICTB 311 Finance for Travel and Service Businesses                             | 4 (4-0-8) |
| ICTB 312 Strategic Management for Travel and Service Businesses                | 4 (4-0-8) |
| ICTB 313 Business Research and Data Analysis for Travel and Service Businesses | 4 (4-0-8) |
| ICTB 314 Revenue Management in Travel and Service Businesses                   | 4 (4-0-8) |

|                                                           |           |
|-----------------------------------------------------------|-----------|
| ICTB 316 Data Analytics for Travel and Service Businesses | 4 (4-0-8) |
| ICTB 324 Hotel Business Development and Management        | 4 (4-0-8) |
| ICTB 335 Restaurant Business Planning and Operations      | 4 (4-0-8) |
| ICTB 355 Creative Event Production                        | 4 (3-2-7) |
| ICTB 364 Spa and Wellness Business                        | 4 (4-0-8) |



# COURSE

— MINORS & CERTIFICATES 2025 - 2026 —

## descriptions

“

*...Short course descriptions, including prerequisites for each course, are available in the academic catalog. Students must thoroughly review the course prerequisites to ensure they possess the necessary background knowledge and skills for successful participation....*

”

# Course Descriptions

## **EGCI 461 Artificial Intelligence**

**4 (4-0-8)**

**Prerequisites:** EGCI 221 Data Structures and Algorithms

The foundations of artificial intelligence, solving problems by searching, knowledge representation, the first-order logic, the inference in the first-order logic; the probabilistic reasoning systems; an introduction to Prolog, the natural language processing; machine learning techniques; model evaluation; deep learning

## **ICBE 311 Economics of Competition**

**4 (4-0-8)**

**Prerequisite:** ICMB 253 Microeconomics

Competition and sustainability linkages at individual and market level; role of policy for competition and sustainability; market definition and market power; mergers and acquisitions; antitrust policies and regulations; firms' individual behaviour under different competition environments; pricing strategies; product differentiation; vertical relations and sustainable supply chains; data analysis in competition economics

## **ICBE 312 World Economy**

**4 (4-0-8)**

**Prerequisite:** ICMB 253 Microeconomics, ICMB 254 Macroeconomics

Interdependence among countries and its effects on economies; Gains and losses from trade; Pattern of free trade; Government restrictions on trade and the effects on production, rate of consumption, prices of goods and services, economic growth, and income distribution; The decline of national barriers and the rise of non-tariff barriers and their underlying motivations; Pros and cons on joining trade blocs and of imposing trade sanctions; Labor and capital movements across countries, with the focus on Thailand; Balance of payments and international monetary system; The working of foreign exchange market and the reasons behind countries' choices of exchange rate regime; Thailand's managed floating exchange rate system; Cases of past and current financial crises; Analysis of success and failure of prominent international institutions

## **ICBE 313 Business Econometrics**

**4 (4-0-8)**

**Prerequisite:** ICMB 150 Introduction to Programming and Business Application, ICMB 152 Business Statistics

An introduction to the field of econometrics; simple regression analysis; multiple regression analysis; hypothesis testing, multicollinearity, heteroskedasticity; specification analysis and model selection; programming application for econometrics

#### **ICBE 322 Economics of Sustainability**

**4 (4-0-8)**

**Prerequisite:** ICMB 253 Microeconomics, ICMB 254 Macroeconomics, ICMB 351 Business Ethics and Sustainability

concepts of sustainability; eco-environmental sustainability; externalities and market failures; value of environment for the economy; economics of natural resources; economics of international environmental problems; future generations' and ecosystems' moral standing as stakeholders; taxonomies and materiality; agency and governance; growth and environmental degradation; macroeconomic policies for sustainability; international trade and sustainability; circular economy and business models

#### **ICBE 411 Economics of Innovation**

**4 (4-0-8)**

**Prerequisite:** ICMB 253 Microeconomics

Concept and types of innovations; innovation and sustainable development; human-centered approach for innovation; microeconomics of consumer behavior ; microeconomics of producer behavior; innovation and market dynamics; adoption of innovation; firm's innovation strategies; role of policy for innovation

#### **ICBE 412 Economic Policy Analysis**

**4 (4-0-8)**

**Prerequisite:** ICMB 152 Business Statistics, ICBE 312 World Economy

Welfare economics theory; public goods; the distribution of income and wealth; public policy analysis; supply-side policy; monetary theory and policy; transmission of monetary policy; central bank operations; evolution of monetary institutions

#### **ICBE 421 Data Analytics in Economics and Finance**

**4 (4-0-8)**

**Prerequisite:** ICMB 150 Introduction to Programming and Business Application, ICMB 152 Business Statistics, 3rd year status

The theoretical principles of statistics with a focus on practical applications in economic and finance settings; data sampling and cleaning; descriptive statistics for data exploration; techniques of communicating the results; data transformations and dimensionality reduction; prediction-based machine learning tools, regression, classification, clustering; programming application for data analytics

**ICBE 422 Time Series Analysis****4 (4-0-8)**

**Prerequisite:** ICMB 150 Introduction to Programming and Business Application, ICMB 152 Business Statistics, ICBE 313 Business Econometrics

An introduction to time series analysis; autoregressive (AR) model; moving average (MA) model; autoregressive moving average (ARMA) model; trends; seasonality; ARCH model; GARCH model; VAR/VECM models; cointegration; forecasting; applications of time series methods to actual (financial) time series data using econometric software packages

**ICBI 105 Molecules to Living Cells****4 (2-4-6)**

**Prerequisites:** None

Properties of life, classification, and scientific process; chemistry of life; cells and metabolism; genetics; molecular biology; practical exercises are included

**ICBI 106 Organisms to Ecosystems****2 (2-0-4)**

**Prerequisites:** None

The diversity of life; plant forms and functions; animal forms and functions; mechanism of evolution; ecology and behavior

**ICBI 110 Quantitative Reasoning in Biological Sciences****4 (4-0-8)**

**Prerequisite:** None

Essential mathematical and statistical concepts in biology; applications of quantitative reasoning in biological sciences; quantitative analysis, mathematical modeling of biological processes, data interpretation, and numerical-based problem-solving through real-world examples from biology, ecology, genetics, and other biological science disciplines

**ICBI 213 Genetics****4 (4-0-8)**

**Prerequisite:** ICBI 105 Molecules to Living Cells

DNA as genetic material, Mendelian genetics, chromosomal basis of heredity, complex traits, evolutionary genetics, molecular genetics, formulation of genetic hypotheses

**ICBI 214 General Microbiology****4 (4-0-8)**

**Prerequisite:** ICBI 105 Molecules to Living Cells

Structures, physiology and ecology of viruses, bacteria, protozoa and fungi especially bacteria, aspects of microbiology importance in health, sanitation, food processing and industry

### **ICBI 218 Cellular Systems**

**4 (4-0-8)**

**Prerequisite:** ICBI 105 Molecules to Living Cells

Structures and functions of cellular organelles, focusing on their roles within the broader context of cellular systems; analysis of key cellular activities, including metabolism, signal transduction, and the cell cycle; examination of how cells interact with each other and communicate with their environment; integration of cellular components, organelle dynamics, intracellular transport, and the molecular mechanisms underlying cell-to-cell interactions; cellular homeostasis and adaptation to external stimuli

### **ICBI 232 Comparative Anatomy and Physiology of Animals and Plants**

**4 (3-2-7)**

**Prerequisite:** ICBI 106 Organisms to Ecosystems

Comparative anatomy and physiology of animals and plants; evolutionary adaptations and functional relationships across diverse taxa; structural and physiological similarities and differences in systems; practical exercises included

### **ICBI 263 Practical Sustainability and Biodiversity**

**4 (2-4-6)**

**Prerequisite:** ICBI 106 Organisms to Ecosystems, ICMA 151 Statistics for Science I

Exploration of sustainability and biodiversity through hands-on fieldwork and research; review sustainability and biodiversity literature, develop research questions, and design investigations focused on real-world environmental challenges; assessing and conserving biodiversity across various ecosystems; sampling strategies; field work included

### **ICBI 302 Mechanisms of Gene Expression**

**2 (2-0-4)**

**Prerequisites:** ICBI 213 Genetics

In-depth exploration of the molecular processes that govern gene expression in both prokaryotic and eukaryotic systems; bacterial transcription and its regulatory mechanisms; eukaryotic transcription and translation; mRNA maturation and processing; role of chromatin structure in regulating gene expression

### **ICBI 303 Basic Immunology**

**4 (4-0-8)**

**Prerequisite:** ICBI 214 General Microbiology

Current understanding of the cellular and molecular interactions in the inductions, expression, and regulation of the cellular and humoral immune responses; recent knowledge and applications concerning immunity to various microbial infections as well as antigen-antibody interactions; serodiagnosis and detection of cell-mediated immune response

**ICBI 305 Techniques in Molecular Science****4 (2-4-6)****Prerequisite:** ICBI 106 Organisms to Ecosystems

Human anatomy and function; laboratory exercises dissections of human cadavers: head, neck, back, anterior chest wall and upper limb

**ICBI 314 Genetics of Bacteria and Viruses****2 (2-0-4)****Prerequisite:** ICBI 214 General Microbiology

Principles of microbial genetics, including the organization, regulation, and evolution of bacterial and viral genomes; gene expression, genetic recombination, mutation, and horizontal gene transfer in bacteria, as well as the life cycles, genetic diversity, and evolution of viruses

**ICBI 325 Special Topics in Bioinformatics and Molecular Genetics****4 (4-0-8)****Prerequisite:** ICBI 218 Cellular Systems, ICCH 231 Biochemistry

Exploration of specific topics in bioinformatics and molecular genetics and/or a specific sub discipline in bioinformatics; class/group discussion on peer-review articles

**ICBI 329 Animal and Plant Behavior****4 (4-0-8)****Prerequisite:** ICBI 106 Organisms to Ecosystems

Theories of animal and plant behavior from various biological disciplines, including ecology, evolution, physiology, neurobiology, and genetics; mechanisms of animal behavior and plant behavior; interactions between organisms

**ICBI 350 Techniques in Molecular Science****4 (2-4-6)****Prerequisite:** ICBI 232 Biochemistry Laboratory

Comprehensive introduction to the fundamental techniques and tools used in molecular biology combining theoretical lectures with hands-on laboratory practices; DNA cloning, gel electrophoresis, polymerase chain reaction (PCR), and molecular sequence analysis; practical applications and indepth discussions

**ICBI 378 Bioinformatics****4 (4-0-8)****Prerequisite:** ICCS 102 Coding for All, ICBI 218 Cellular Systems

An introduction to computational approaches in biological systems; biological database; high throughput technologies in biology; the analysis of sequencing data including genomic, transcriptomics, and proteomics; phylogenetics, the analysis of protein structure

**ICBI 379 Introduction to Systems and Structural Biology****4 (4-0-8)****Prerequisite:** ICBI 218 Cellular Systems, ICCH 231 Biochemistry

Holistic perspective for biological systems; interactions and regulatory networks; the principles of structural biology, including nucleic acid structure, protein structure and function, and macromolecule complex; the principles of techniques used in the study of structural biology; computational and statistical methods for analyzing biological data

**ICBI 381 Evolutionary Biology****4 (4-0-8)****Prerequisite:** ICBI 106 Organisms to Ecosystems

Natural selection; molecular evolution; evolutionary genomics; species and speciation; taxonomy and phylogeny; macroevolution; evolution, coevolution and radiation; biogeography; evolutionary biology and ecology; evolutionary biology and conservation

**ICBI 383 Systematic Biology and Biodiversity****2 (2-0-4)****Prerequisite:** ICBI 106 Organisms to Ecosystems

Theory and procedures of classical and modern systematic analysis in botanical or zoological systems, based on either morphological or molecular characters; introduction to phylogenetic construction and analysis; character construction and weighting; characters in molecular systematics; ways of evaluating the quality of systematic results in morphological and molecular data; the comparative method; cladistic biogeography; coevolution; species concepts; classification and the nomenclatorial codes

**ICBI 385 Freshwater Ecology and Conservation****4 (4-0-8)****Prerequisite:** ICBI 106 Organisms to Ecosystems

Adaptations; behavior; diversity; physiology; ecological roles; trophic interactions; diversity and productivity; influence of catchment; human activities; significance of global climate changes; increasing competition for water resources; sustainable management; conservation measures

**ICBI 386 Practical Freshwater Ecology and Conservation****2 (0-4-2)****Prerequisite:** ICBI 106 Organisms to Ecosystems

Laboratory procedures; field techniques; measuring abiotic conditions; surveying biotic communities; assessing trophic interactions; headwater streams; floodplains; standing waters; evaluating anthropogenic impacts; rehabilitation & restoration; water resource conservation

**ICBI 387 Terrestrial Ecology and Conservation****4 (4-0-8)****Prerequisite:** ICBI 106 Organisms to Ecosystems

Adaptations; behaviour; diversity & productivity; physiology; ecological roles; trophic interactions; ecosystems and resources; land-use change; anthropogenic activities; sustainable management; significance of global climate change; conservation measures

**ICBI 388 Practical Terrestrial Ecology and Conservation****2 (0-4-2)****Prerequisite:** ICBI 106 Organisms to Ecosystems

Laboratory and field procedures; experimental design; mapping habitats; measuring abiotic conditions; analysing biotic communities; diversity indices; similarity indices; biotic interactions; behaviour; evaluating anthropogenic impacts; a habitat reconstruction; conservation

**ICBI 389 Infectious Disease Ecology****4 (4-0-8)****Prerequisite:** ICBI 214 General Microbiology, ICCH 231 Biochemistry

An ecological exploration of the changes in human biology, culture, and surrounding environments that have influenced patterns of health and disease; ecology and infectious disease (e.g., zoonotic and emerging), urbanization, global climate change, stratospheric ozone depletion and innovations in public health and medicine

**ICBI 407 Occupational Health and Safety****4 (4-0-8)****Prerequisites:** ICBI 208 Ethics for Bioscience **AND** ICMA 252 Biological Statistics Laboratory

Environmental factors at work regarding workers' health and safety, such as air, water, food, chemical or biological materials handled in the production line, including waste and waste disposal; evaluation harmful effects of such factors for controlling them; prevention of dissatisfaction and risk assessment in the workplace

**ICBI 416 Community Health Innovation****4 (4-0-8)****Prerequisite:** ICBI 219 Design Thinking in Biological Sciences

Survey of community health status; primary health care concept; health system analysis and health manpower development; biodesign; needs identifications; product and/or process to address health problems; health innovations and prototyping

**ICBI 417 Design Thinking in Health Innovation****4 (4-0-8)****Prerequisite:** ICBI 219 Design Thinking in Biological Sciences

Designing idea thinking ideas; customers' problems related to biodesigning solutions for healthcare and wellness models; the intellectual property; customers and customers' problem validation; the Customer Journey Map; the Stakeholder Map; the Lean Canvas; showcases with entrepreneurial experts

**ICBI 418 Case Studies in Health Innovation**

**4 (4-0-8)**

**Prerequisite:** ICBI 219 Design Thinking in Biological Sciences

Case studies in health; problem identification; stakeholder and SWOT analyses; problem solving in health; knowledge transfer and innovative solutions in health; innovation gaps and alternative solutions; translation and commercialization of ideas

**ICBI 419 Cutting-Edge Technology for Biodesign**

**4 (2-4-6)**

**Prerequisite:** ICBI 219 Design Thinking in Biological Sciences

Specific skills for bio innovation and prototype designs in health

**ICBI 420 Entrepreneurship and Innovation in Science**

**4 (4-0-8)**

**Prerequisite:** ICBI 219 Design Thinking in Biological Sciences

Developing the entrepreneur mindset through life science and innovation; from academia to entrepreneur, current trends in biomedical industry; how to do a startup project; find opportunities and passion driving innovation; considering factors for successful entrepreneurship, including business plans, finding funds, regulatory requirements, market needs; ethics and professionalism; intellectual property and risks

**ICBI 422 Insects Biology and Ecology**

**4 (3-2-7)**

**Prerequisite:** ICBI 106 Organisms to Ecosystems

Insect morphology, physiology, systematics, natural history, and relationships with human; field survey with laboratory exercises are included

**ICBI 443 Fungal Ecology**

**4 (3-2-7)**

**Prerequisite:** ICBI 214 General Microbiology

Ecology of fungi and fungi-like microorganisms (slime molds and water molds); importance in food chains; nutrient recycling; morphology and physiology; nutrition and metabolism; growth and differentiation; reproduction and life cycles; classification; ecological roles; culture collection; advantages of fungi and fungal products

**ICBI 440 Marine Ecology and Conservation****4 (4-0-8)****Prerequisite:** ICBI 263 Practical Sustainability and Biodiversity

Adaptations; behaviour; diversity; physiology; ecological roles; marine ecosystems; marine resources; trophic interactions; human activities; sustainable management; significance of global climate change; coral reef bleaching; reef rehabilitation & restoration; mangrove deforestation & reforestation; conservation measures

**ICBI 442 Practical Marine Ecology and Conservation****2 (0-4-2)****Prerequisite:** ICBI 263 Practical Sustainability and Biodiversity

Laboratory and field procedures; analyzing abiotic conditions; surveying biotic communities; assessing productivity; evaluating anthropogenic threats

**ICBI 341 Neurobiology****4 (4-0-8)****Prerequisite:** ICBI 106 Organisms to Ecosystems

Developmental neurobiology, neuroanatomy, and neurophysiology; some clinical aspects as the results of neuropathological defects or lesions; practical exercises included

**ICCD 111 Research & Conceptual Development****4 (2-4-6)****Prerequisite:** None

An investigation of a wide variety of research methods facilitating the creative practice; content-based assignments intended to challenge students' conceptual, critical, and communicative skills; encouragement of experimentation, exploration of self-developed concepts, and risk-taking to the formulation of ideas; reflective consideration of the various ways these concepts can be presented; communicating effectively with the target audience; producing engaging and informative creative projects

**ICCD 114 2 Dimensional Design & Color Theory****4 (2-4-6)****Prerequisite:** None

Foundations and principles of pictorial design; a focus on the concepts of the picture plane, figure/ground relationships, scale and proportional transformation, composition, a study of the additive and subtractive principles of color theory as they apply to the communication design process, and value; the development of a range of design vocabulary and repertoire of practical techniques; an introduction to formal design strategies

**ICCD 116 Digital Images and Processes****4 (2-4-6)****Prerequisite:** None

A focus on digital photography, manipulation of photographic images, and the use of illustration software using a project approach; an emphasis on processes and ancillary operations related to the digital media

#### **ICCD 114 2D 2 Dimensional Design & Color Theory**

**4 (2-4-6)**

**Prerequisite:** None

Foundations and principles of pictorial design; a focus on the concepts of the picture plane, figure/ground relationships, scale and proportional transformation, composition, a study of the additive and subtractive principles of color theory as they apply to the communication design process, and value; the development of a range of design vocabulary and repertoire of practical techniques; an introduction to formal design strategies

#### **ICCH 101 General Chemistry I**

**4 (4-0-8)**

**Prerequisites:** ICMA 100 Foundation Mathematics **OR** ICMA101 Precalculus **OR** Placement in ICMA 106 Calculus I

Concepts of general chemistry; matters, atoms, compounds, reactions, gases, thermodynamics, electrons in atoms, periodic table, chemical bonding; intermolecular forces, and spontaneous changes

#### **ICCH 100 Chemistry and Careers**

**1 (1-0-2)**

**Prerequisites:** None

Introduction to the diverse array of professional opportunities in the field of chemistry; Green chemistry and sustainability, different sectors that chemists work including academia, industry and government; educational and professional pathways including graduate school, internships and professional organizations; technical knowledge and skills for career development

#### **ICCH 102 General Chemistry II**

**4 (4-0-8)**

**Prerequisites:** ICCH 101 General Chemistry I

Comprehensive general concepts and principles of chemistry; solutions, equilibria, acids and bases, solubility, electrochemistry, chemical kinetics, chemistry of main-group and transition elements, coordination compound, nuclear chemistry and selected topics in chemistry

#### **ICCH 103 Integrated Laboratory in Chemistry**

**2 (0-4-2)**

**Prerequisites:** ICCH 101 General Chemistry I

Laboratory practicals for general chemistry: measurements; stoichiometry; solids, liquids and solutions; gases; thermochemistry; equilibrium; acids, bases and buffers; electrochemistry; kinetics; chemical safety practice and regulations

**ICCH 221 Organic Chemistry I**

**4 (4-0-8)**

**Prerequisites:** ICCH 102 General Chemistry II

Concepts and mechanistic considerations of organic chemistry; molecular structures and properties; methane and alkane chemistries; stereochemistry; acyclic compounds; alkyl halides; alkenes; conjugation and resonance; alcohols; ethers and epoxides; alkynes

**ICCH 222 Organic Chemistry II**

**4 (4-0-8)**

**Prerequisites:** ICCH 221 Organic Chemistry I

Concepts of organic reactions through mechanistic approach; aromaticity and electrophilic aromatic substitution; spectroscopy and structure; aldehydes and ketones; carboxylic acids and derivatives; carbanions, amines, phenol and aryl halides; fats; carbohydrates; amino acids

**ICCH 224 Organic Chemistry Laboratory**

**2 (0-4-2)**

**Prerequisites:** ICCH 103 Integrated Laboratory in Chemistry and ICCH 221 Organic Chemistry I

Fundamental organic laboratory techniques; recrystallization, refluxing, distillation, extraction, chromatography, spectroscopy; laboratory safety

**ICCH 231 Biochemistry**

**4 (4-0-8)**

**Prerequisites:** ICBI 105 Molecules to Living Cells, ICCH 221 Organic Chemistry I **OR** Lecturer permission

Structure and function of biomolecules, including proteins, carbohydrates, lipids, and nucleic acids; enzyme kinetics and catalysis; metabolism; regulations at the cellular and molecular levels

**ICCH 232 Biochemistry Laboratory**

**2 (0-4-2)**

**Prerequisites:** ICBI 105 Molecules to Living Cells and ICCH 221 Organic Chemistry I

**Corequisites:** ICCH 231 Biochemistry

Laboratory practicals in biochemistry; error and statistical analysis of experimental data; physical and chemical properties of biomolecules; spectroscopic methods; electrophoretic techniques; chromatographic separations; isolation and characterization of biological materials; enzyme kinetics

**ICCH 261 Analytical Chemistry and Instrumental Analysis****4 (4-0-8)****Prerequisites:** ICCH 102 General Chemistry II and ICMA 151 Statistics for Science I**Corequisites:** ICCH 262 Analytical Chemistry Laboratory

Errors and statistics in analytical process; calibration methods; principles and applications of chemical equilibria, electrochemistry, separation techniques and chromatography, atomic and molecular spectroscopy, and mass spectrometry in qualitative and quantitative chemical analysis; concepts of quality assurance

**ICCH 262 Analytical Chemistry Laboratory****2 (0-4-2)****Prerequisites:** ICCH 103 Integrated Laboratory in Chemistry**Corequisites:** ICCH 261 Analytical Chemistry and Instrumental Analysis

Laboratory practicals involving classical and instrumental methods of chemical analysis, with statistical treatment of analytical data

**ICCH 321 Chemical Spectroscopy****4 (4-0-8)****Prerequisites:** ICCH 222 Organic Chemistry II **AND** ICCH 224 Organic Chemistry Laboratory

Exploration of theories and interpretative applications of spectroscopy to determine chemical molecular structures; absorption and emission spectroscopy; mass spectrometry; UV-Visible spectroscopy; infrared spectroscopy; proton and carbon-13 nuclear magnetic resonance; 1D and 2D-NMR

**ICCH 322 Polymer Science and Technology****2 (2-0-4)****Prerequisites:** ICCH 222 Organic Chemistry II

Principles and synthesis of polymers; structure-property relationships of polymers; diverse applications of polymers across various industries

**ICCH 363 Physical Chemistry A****4 (4-0-8)****Prerequisites:** ICCH 102 General Chemistry II **AND** ICMA 106 Calculus I

Concepts of classical physical chemistry; electrochemical cells; kinetics; composite reaction mechanisms; behavior of gases; the first law of thermodynamics, the second and the third laws of thermodynamics; chemical equilibrium; phases and solutions; phase equilibria

**ICCH 364 Physical Chemistry B****4 (4-0-8)****Prerequisites:** ICCH 363 Physical Chemistry A **AND** ICMA 106 Calculus I

Concepts of modern physical chemistry; quantum mechanics; atomic structure and chemical bonding; computational and theoretical chemistry

**ICCH 365 Physical Chemistry Laboratory**

**2 (0-4-2)**

**Prerequisites:** ICCH 262 Analytical Chemistry Laboratory **AND** ICCH 363 Physical Chemistry A

Laboratory practicals for physical chemistry; thermodynamics laws and enthalpy; kinetics and rate laws; molecular spectroscopy; atomic absorption spectrometry; Raman spectrometry; mass spectrometry; electrochemistry

**ICCH 391 Inorganic Chemistry A**

**4 (4-0-8)**

**Prerequisites:** ICCH 102 General Chemistry II

The structure of the atom, periodicity of the elements; molecular models and chemical forces, symmetry and group theory, molecular orbital theory, The structure of crystalline solids and acid-base theory in inorganic chemistry

**ICCH 392 Inorganic Chemistry B**

**4 (4-0-8)**

**Prerequisites:** ICCH 391 Inorganic Chemistry A

Chemistry of the main group elements, chemistry of coordination compounds including structures and isomers, valence bond theory, crystal field theory, ligand field theory, electronic spectra, reactions and mechanisms and organometallic reactions and catalysis

**ICCH 393 Inorganic Chemistry Laboratory**

**2 (0-4-2)**

**Prerequisites:** ICCH 392 Inorganic Chemistry B

Experiments related to the structure of crystalline solids, symmetry and point group, chemistry of the main group elements, chemistry of coordination compounds

**ICCH 471 Chemical Unknown Detective**

**2 (0-4-2)**

**Prerequisites:** ICCH 262 Analytical Chemistry Laboratory

Selected techniques of substance identification and substance quantification; case studies or field study and laboratory practice

**ICCH 402 Undergraduate Thesis**

**6 (0-12-6)**

**Prerequisites:** lecturer permission

A research project in chemistry under the supervision of an advisor. The course is designed for the chemistry major to be acquainted with the techniques, management and the implementation of a research project

**ICCH 403 Field Study A**

**1 (0-3-1)**

**Prerequisites:** ICCH 100 Chemistry AND Careers and ICCH 102 General Chemistry II

Field study on commercial operations in chemistry-related organizations

**ICCH 404 Field Study B**

**1 (0-3-1)**

**Prerequisites:** ICCH 100 Chemistry AND Careers and ICCH 102 General Chemistry II

Field study on fundamental research or public service in chemistry-related organizations

**ICCH 451 Advanced Organic Chemistry**

**2 (2-0-4)**

**Prerequisites:** ICCH 222 Organic Chemistry II

Advanced concepts of organic chemistry with physical chemistry and mechanistic approaches and employing prior knowledge of organic chemistry to understand in detail advanced topics: stereochemistry; kinetics and equilibria thermodynamics; conformation and reactivity; molecular orbital theory and pericyclic reactions

**ICCH 452 Materials Science**

**2 (2-0-4)**

**Prerequisites:** ICCH 102 General Chemistry II

Fundamental concepts of material science and engineering; structure, energetics, and bonding as well as principles of nuclear materials

**ICCH 453 Computational Chemistry**

**2 (2-0-4)**

**Prerequisites:** ICCH 102 General Chemistry II AND ICMA 106 Calculus I

Introduction to molecular modeling methods to study geometries, properties and reactivities of compounds; molecular mechanics, ab-initio methods, and density functional theory

**ICCH 454 Biophysical Chemistry**

**2 (2-0-4)**

**Prerequisites:** ICCH 231 Biochemistry

Introduction to theory underlying biophysical methods; practical applications to contemporary research problems; fluorescence spectroscopy; single molecule methods

**ICCH 455 Advanced Inorganic Chemistry** 2 (2-0-4)

**Prerequisites:** ICCH 391 Inorganic Chemistry A

The chemistry of the transition element and the role of the organometallic chemistry and catalysis

**ICCH 456 Chemistry Innovation and Entrepreneurship** 2 (2-0-4)

**Prerequisites:** ICCH 100 Chemistry AND Careers and ICCH 102 General Chemistry II

Case studies of chemistry-based startups; fundamentals of intellectual property and patents; market analysis for opportunities; ideation; prototyping and product development; business models; scaling up; pitching and presenting chemistry innovations; hands-on projects

**ICCH 457 Advanced Analytical Chemistry** 2 (2-0-4)

**Prerequisites:** ICCH 261 Analytical Chemistry and Instrumental Analysis

In-depth theories and practical knowledge on modern analytical techniques; novel techniques development and applications on various samples

**ICCH 458 Bioinorganic Chemistry** 2 (2-0-4)

**Prerequisites:** ICCH 391 Inorganic Chemistry A

Application of inorganic chemistry in biological systems; functions and chemistry of metals in biological systems

**ICCH 459 Supramolecular Chemistry** 2 (2-0-4)

**Prerequisites:** ICCH 222 Organic Chemistry II

Fundamental principles of supramolecular chemistry; synthesis and characterization of supramolecular assemblies

**ICCH 460 Petroleum and Petrochemical Industry** 2 (2-0-4)

**Prerequisites:** ICCH 222 Organic Chemistry II

Introduction to the science, technology and business aspects of extracting, refining, and utilizing petroleum and petrochemicals; environmental and societal implications of petroleum extractions; applications of petrochemical in various industries; challenges and opportunities facing the petroleum and petrochemical industry

**ICCS 102 Coding for All** 4 (3-2-7)

**Prerequisites:** None

Introduction to Python programming; basic syntax and data types; control structures; functions; basic data structures: lists, tuples, sets, dictionaries; strings and string operations; file handling; error handling and debugging; working with data from APIs; using external packages

#### **ICCS 111 Programming and Abstractions**

**4 (4-0-8)**

**Prerequisites:** ICCS 102 Coding for All or placement test

Elements of object-oriented programming and the use of an integrated development environment; principles of object-oriented design and problem solving; objects and classes; abstraction and abstract classes; encapsulation and information hiding; inheritance and polymorphism; composition and aggregation; iteration abstractions; abstract data types; recursion; unit testing

#### **ICCS 205 Numerical Computation**

**4 (4-0-8)**

**Prerequisites:** ICCS 102 Coding for All **AND** ICMA 106 Calculus

Taylor's theorem; roots of equations; interpolation; numerical integration and derivative; solutions to systems of equations; Monte Carlo simulation; optimization

#### **ICCS 206 Discrete Mathematics**

**4 (4-0-8)**

**Prerequisites:** ICMA 106 Calculus

Mathematical statements and logical deduction; proves and proof techniques including direct, contradiction, contrapositive, induction, and invariants; summation, asymptotics, and recurrences; counting: combinations, permutations, and basic counting techniques; discrete probability: finite probability space, events, conditional probability, independence, random variables, expectation, variance, covariance, discrete distributions; graphs: tree, tree traversal, undirected graphs, directed graphs, weighted graphs, Euler's tours, isomorphisms, spanning trees

#### **ICCS 209 Data Structures**

**4 (4-0-8)**

**Prerequisites:** ICCS 111 Programming and Abstractions

**Corequisites:** ICCS 206 Discrete Mathematics

Sequential and parallel cost models; asymptotic analysis and implications; abstract data types and data structures, including sequences, ordered and unordered dictionaries, binary search trees, balanced binary search trees, disjoint sets, and priority queues; fundamental algorithms, including searching, sorting, and basic graph algorithms; algorithms design techniques, including inductive reasoning, divide and conquer, dynamic programming, and randomness; limits of computation

#### **ICCS 225 Database Foundations**

**4 (4-0-8)**

**Prerequisites:** ICCS 121 System Skills and Low-level Programming; ICCS 209 Data Structures

Database design and ER models; relational models; relational algebra; concepts and syntax of SQL; storage and indexing; transactions; joins; distributed databases and replication; NoSQL; performance optimization

#### **ICCS 227 Principles of Computer Systems and Architecture**

**4 (4-0-8)**

**Prerequisites:** ICCS 121 System Skills and Low-level Programming

Memory systems and memory management, including caches and virtual memory; exceptional control flows, including exceptions and processes, signals, and non-local jumps; networking and network programming, including socket API and principles behind the networking subsystem; processor architectures and implications to programmers: principles of pipelining and implementation, performance optimization; system-level I/O; concurrent programming, synchronization, and system-level parallel programming; secure coding practice

#### **ICCS 261 Principles of Data Science**

**4 (3-2-7)**

**Prerequisites:** ICCS 102 Coding for All or ICCS 111 Programming and Abstractions; ICMA 151 Statistics for Science I

Introduction to data science; data transformation and cleaning; visualization; exploratory data analysis; dimensionality reduction; principal component analysis; probability theory; sampling; hypothesis testing; modeling and estimation; basic machine learning methodology; regression; classification

#### **ICCS 271 Interaction Design**

**4 (4-0-8)**

**Prerequisites:** ICCS 209 Data Structures

Requirement analyses, including non-functional and functional requirements; data gathering; software design and prototyping; principles of good design; the software life cycle; software development methodologies; quality assurance; cost modeling in software projects; roles and responsibilities in a software design team

#### **ICCS 302 Human Computer Interaction and Visualization**

**4 (4-0-8)**

**Prerequisites:** ICCS 271 Interaction Design

Design and evaluation of information systems and interfaces; user-centered design methods and skills; developing requirements through personas and scenarios; sketching, rapid prototyping and iterations; evaluation techniques: heuristics, cognitive walkthrough, user testing; usability and accessibility; visual design

using principles of human perception and cognition; structured design and evaluation of visualizations; web-based interactive visualizations

### **ICCS 311 Functional and Parallel Programming**

**4 (4-0-8)**

**Prerequisites:** ICCS 209 Data Structures

Functional evaluation and operational semantics; recursive functions, cost analysis, and proofs by induction; datatypes, pattern-matching, and structural recursion/induction; higher-order functions and currying; laziness and streams; cost semantics and parallel cost models such as work and span; theoretical efficiency and basic scheduling; parallelism, including parallel decomposition, tree parallelism, and vector parallelism; shared-memory parallel programming, including OpenMP, fork/join parallelism; standard parallel primitives and algorithms, including prefix scan, map, reduce, and sorting

### **ICCS 312 Algorithms and Tractability**

**4 (4-0-8)**

**Prerequisites:** ICCS 209 Data Structures

Asymptotic analysis (big-O, big-Omega, big-Theta, little-o, little-omega); recurrences; algorithmic strategies, including divide and conquer, greedy, inductive design, and dynamic programming; probabilistic analysis and randomized algorithms; graphs and graph algorithms, including traversal, minimum-spanning tree, shortest paths, network flow; amortized analysis; reduction, tractability, and basic complexity classes; NP-completeness, classic NP-complete problems, and techniques for coping with hard problems

### **ICCS 315 Applied Algorithms**

**4 (4-0-8)**

**Prerequisites:** ICCS 312 Algorithms and Tractability

Selection of topics from the following: hashing in various contexts, including Bloom filters, load balancing, document similarity, and data streaming; dimensionality reduction and nearest-neighbor searching; locality-sensitive algorithms; string algorithms; coding and error correction; and current research in the relevant areas

### **ICCS 320 Computer Networks**

**4 (4-0-8)**

**Prerequisites:** ICCS 227 Principles of Computer Systems and Architecture

Network architecture, layering, and protocols; networked applications; socket programming; reliable data delivery, including flow control; routing and forwarding; local Area Networks; resource Allocation, including congestion control, CDN; mobility; network security

### **ICCS 322 Operating Systems Design and Implementation**

**4 (4-0-8)**

**Prerequisites:** ICCS 227 Principles of Computer Systems and Architecture

Roles and importance of operating systems; overall structure of an operating systems; concept of process and process management; threads; synchronization and mechanisms; CPU scheduling; deadlock; virtual memory and memory management; protection and access control; security and threats

### **ICCS 323 IoT Electronics**

**4 (4-0-8)**

**Prerequisites:** ICCS 121 System Skills and Low-level Programming; ICPY 102 Physics II

Electronic Components; circuit design and analysis; analog circuit; microcontroller programming; networking and data communication; IoT architecture and middleware; cloud-based computing

### **ICCS 324 Computer Architecture**

**4 (4-0-8)**

**Prerequisites:** ICCS 227 Principles of Computer Systems and Architecture

Instruction Set Architecture (ISA); translation from a high-level language to hardware operations; processor design; pipelining; branch prediction, caching; memory subsystem; memory hierarchy; locality; virtual memory; memory management unit; programming paradigms

### **ICCS 340 Web Application Development**

**4 (4-0-8)**

**Prerequisites:** ICCS 209 Data Structures

Protocols for web-based application; HTML; DOM; CSS; JavaScript; authentication; authorization; single-page application development; multi-pages application development; client-side validation; server-side validation; MVC and related design patterns; web services; micro services; deployment; security issues

### **ICCS 361 Data Mining**

**4 (4-0-8)**

**Prerequisites:** ICCS 209 Data Structures; ICCS 261 Principles of Data Science

Overview of data mining and its applications; software stack for data mining; acquiring data from web-scraping and data APIs; structured, semi-structured, unstructured data; data cleansing and manipulation; dimensionality reduction; exploratory data analysis and visualization; large-scale data platforms including HDFS; machine learning algorithms for large data sets; recommendation systems; natural language processing and its applications

### **ICCS 362 Data Engineering**

**4 (4-0-8)**

**Prerequisites:** ICCS 225 Database Foundations; ICCS 261 Principles of Data Science

Overview of data engineering; data modeling and database systems; data ingestion and extraction; data transformation and cleaning; data pipelines and workflow orchestration; data storage and retrieval technologies; streaming and real-time processing; scalability and performance optimization; security and compliance

#### **ICCS 370 Software System Construction**

**4 (4-0-8)**

**Prerequisites:** ICCS 209 Data Structures

Modern development tools, including development environments, build tools, test automation, debugger; profiling and performance tuning; software verification; software testing; UML diagrams; design patterns; system architectures; entity design and conceptual modeling; source code refactoring; secure coding practice; roles and responsibilities in a software development team

#### **ICCS 371 Scalable Systems**

**4 (4-0-8)**

**Prerequisites:** ICCS 311 Functional and Parallel Programming; ICCS 370 Software System Construction

Challenges in constructing scalable distributed systems; system models and architectural patterns; networking and operating system support; RPC and middleware; binding and naming; synchronization; naming and directory services; distributed transaction processing; data replication; scalable databases

#### **ICCS 372 Software Engineering**

**4 (4-0-8)**

**Prerequisites:** ICCS 370 Software System Construction

Requirements analysis, including non-functional and functional requirements; data gathering; design and prototyping; principles of good design; the software life cycle; software-development methodologies; quality assurance; cost modeling in software projects

#### **ICCS 373 Cloud Computing**

**4 (4-0-8)**

**Prerequisites:** ICCS 225 Database Foundations

Roles of cloud computing in modern software system development; benefits and risks of cloud computing; using cloud for compute, storage, and networking; cloud service models, and cloud deployment models

#### **ICCS 402 Senior Project in Computer Science I**

**4 (0-8-4)**

**Prerequisites:** ICCS 309; ICCS 312 Algorithms and Tractability

Initiation of a research or development project in computer science or related fields under the supervision of an advisor; conducting preliminary research into the problem to identify a proper scope and research questions; the design and measurements of the research/development project proposed in the prerequisite

course under supervision of the advisor; delivery of a written report and an oral presentation of the senior project proposal

#### **ICCS 403 Senior Project in Computer Science II**

**4 (0-8-4)**

**Prerequisites:** ICCS 402 Senior Project in Computer Science I

Conducting an actual investigation/experiment that has been designed in the prerequisite course; analyzing gathered data to address the proposed research thesis; delivery of a written report and an oral presentation of the work in all three senior project courses as a whole

#### **ICCS 404 Computer Graphics and Augmented Reality**

**4 (4-0-8)**

**Prerequisites:** ICCS 209 Data Structures; ICMA 240 Linear Algebra I

Representation and manipulation of graphical data; two-dimensional and three-dimensional transformations; curves; surfaces; projection; illumination and shading models; raster and vector graphic I/O devices; augmented reality technologies; basic object and location tracking; representation of augmented reality content

#### **ICCS 412 Topics in Theory I**

**4 (4-0-8)**

**Prerequisites:** ICCS 312 Algorithms and Tractability

Topic(s) from areas of theoretical computer science, including data structures, algorithms, and complexity theory, chosen according to current research and industrial trends

#### **ICCS 413 Topics in Theory II**

**4 (4-0-8)**

**Prerequisites:** ICCS 312 Algorithms and Tractability

Topic(s) from areas of theoretical computer science, including data structures, algorithms, and complexity theory, chosen according to current research and industrial trends

#### **ICCS 414 Topics in Theory III**

**4 (4-0-8)**

**Prerequisites:** ICCS 312 Algorithms and Tractability

Topic(s) from areas of theoretical computer science, including data structures, algorithms, and complexity theory, chosen according to current research and industrial trends

#### **ICCS 418 Computer System Security**

**4 (4-0-8)**

**Prerequisites:** ICCS 227 Principles of Computer Systems and Architecture

Security trends; information security and risk managements; access control, security architecture and design; physical and environmental security; telecommunications and network security; cryptography; business continuity and disaster recovery; legal/regulation compliance and investigations; application security; operation security; practical workshops of basic firewall appliance, DMZ and IPS

**ICCS 423 Topics in Systems I**

**4 (4-0-8)**

**Prerequisites:** ICCS 227 Principles of Computer Systems and Architecture

Topic(s) from areas of systems in computer science chosen according to current research and industrial Trends

**ICCS 424 Topics in Systems II 4 (4-0-8)**

**Prerequisites:** ICCS 227 Principles of Computer Systems and Architecture

Topic(s) from areas of systems in computer science chosen according to current research and industrial trends

**ICCS 425 Topics in Systems III**

**4 (4-0-8)**

**Prerequisites:** ICCS 227 Principles of Computer Systems and Architecture

Topic(s) from areas of systems in computer science chosen according to current research and industrial trends

**ICCS 431 Cooperative and Work integrated Education Seminar**

**2 (2-0-4)**

**Prerequisites:** Completed at least 96 credits

Working as an actual employee under guidance of course coordinator and supervisors for at least 12 continuous weeks

**ICCS 432 Cooperative and Work integrated Education I**

**3 (0-40-8)**

**Prerequisites:** ICCS 431 Cooperative and Work integrated Education Seminar

Working as an actual employee under guidance of course coordinator and supervisors for at least 12 continuous weeks

**ICCS 433 Cooperative and Work integrated Education II**

**3 (0-40-8)**

**Prerequisites:** ICCS 432 Cooperative and Work integrated Education I

Working as an actual employee from previous trimester under guidance of course coordinator and supervisors for at least 4 continuous weeks

#### **ICCS 445 E-Commerce Innovation and Technology Management**

**4 (4-0-8)**

**Prerequisites:** ICCS 271 Interaction Design; ICCS 370 Software System Construction

History of e-commerce, real and virtual networks, supply-side versus demand-side scale economies, business models Integration of technology and business within the fast-changing e-commerce landscape. Contemporary e-commerce platforms, emphasizing the technical aspects such as platform architecture, AI-based personalization, and security measures Key business strategies required for digital transformation Seamless omnichannel experiences Development of ecommerce ventures Creation deployment and management cutting-edge e-commerce solutions that meet the needs of today's digital marketplace

#### **ICCS 448 Mobile Application Programming**

**4 (4-0-8)**

**Prerequisites:** ICCS 271 Interaction Design; ICCS 370 Software System Construction

Mobile application platforms; cross-platform framework; native application development; single-view and multi-view application development; database for mobile application, local files and media; connecting to web-services: JSON, XML; working with sensors and GPS; UI design for multiple screen sizes; publishing mobile application

#### **ICCS 461 Machine Learning**

**4 (4-0-8)**

**Prerequisites:** ICCS 205 Numerical Computation; ICCS 261 Principles of Data Science

Probability and maximum likelihood estimate; k-nearest neighbor methods; decision tree and basic information theory; regressions; ensemble learning algorithms including bagging, boosting and random forest; support vector machines; perceptron and neural networks; deep learning; unsupervised learning; semi-supervised learning; PAC learning and VC dimension

#### **ICCS 462 Deep Learning**

**4 (4-0-8)**

**Prerequisites:** ICCS 261 Principles of Data Science; ICMA 218 Multivariable Calculus

Fundamentals of neural networks; shallow and deep networks; gradient and loss functions; model training and evaluation; regularization; convolutional networks; image generation models; sequence models; transformer models; large language models

#### **ICCS 463 Special Topics in Machine Learning I**

**4 (4-0-8)**

**Prerequisites:** ICCS 205 Numerical Computation; ICCS 261 Principles of Data Science

Topic(s) from areas of Machine Learning chosen according to current research and industrial trends

**ICCS 464 Special Topics in Machine Learning II** 4 (4-0-8)

**Prerequisites:** ICCS 205 Numerical Computation; ICCS 261 Principles of Data Science

Topic(s) from areas of Machine Learning chosen according to current research and industrial trends

**ICCS 465 Special Topics in Machine Learning III** 4 (4-0-8)

**Prerequisites:** ICCS 205 Numerical Computation; ICCS 261 Principles of Data Science

Topic(s) from areas of Machine Learning chosen according to current research and industrial trends

**ICCS 471 Topics in Software Technology I** 4 (4-0-8)

**Prerequisites:** ICCS 271 Interaction Design

Topic(s) from areas of Software Technology chosen according to current research and industrial trends

**ICCS 472 Topics in Software Technology II** 4 (4-0-8)

**Prerequisites:** ICCS 271 Interaction Design

Topic(s) from areas of Software Technology chosen according to current research and industrial trends

**ICCS 473 Topics in Software Technology III** 4 (4-0-8)

**Prerequisites:** ICCS 271 Interaction Design

Topic(s) from areas of Software Technology chosen according to current research and industrial trends

**ICCS 491 Topics in Computer Science I** 4 (4-0-8)

**Prerequisites:** ICCS 209 Data Structures

Topic(s) from areas of computer science chosen according to current research and industrial trends

**ICCS 492 Topics in Computer Science II** 4 (4-0-8)

**Prerequisites:** ICCS 209 Data Structures

Topic(s) from areas of computer science chosen according to current research and industrial trends

**ICFA 232 Moving Images by Design** 4 (2-4-6)

**Prerequisite:** None

An introduction to the international design world; focus on experiential learning; exposure to international designers; professional design culture and challenges including cultural heritage and contemporary design practice; design terminology; applications of eco-friendly and sustainable design; new and innovative technologies and current design trends; digital, interactive, and online platforms

### **ICFA 233 Storytelling by Design**

**4 (4-0-8)**

**Prerequisite:** None

An introduction, practice and an application of storytelling languages and structured craft approach; including the art of storytelling, elements and structure of a story, narrative techniques, story development in multiple film and media-related platforms; the creative application to any of the following screenwriting, short films, television, and/or design related outcomes, such as campaigns, posters, adverts, applications, products, etc.

### **ICFA 334 Animation Principles and Production**

**4 (2-4-6)**

**Prerequisite:** None

An introduction, practice and application to the 12 principles of animation; including familiarity with key principles of design and animation and an understanding of simple narrative structure; practical creative experience in the development and construction processes of animation production: hand-drawn and stop motion techniques; technical proficiency with media and animation software. Understanding of copyright and privacy issues in relation to content, audience and distribution of animation

### **ICFA 335 Character and Concept Design**

**4 (2-4-6)**

**Prerequisite:** None

An introduction, practice and application to the fundamental tools for designing and developing concepts and character for narratives; including familiarity with key principles of design, aesthetics and basic understanding of simple narrative structure; understand the development and construction processes; technical proficiency with suitable media and software processes for designing concept and character bible for various media platforms and audiences

### **ICFA 336 Cinematic Language and Its Application**

**4 (4-0-8)**

**Prerequisite:** None

An introduction, practice and an application of languages to critical thinking and analysis; examine key film languages and textual examples, including narrative theories; genre, film theories; an analysis of key film texts; the development of skills in research, writing and analytical thinking; applied knowledge to creative works. The presentation of original ideas and reflection on craft approach.

### **ICFA 233 Storytelling by Design**

**4 (4-0-8)**

**Prerequisite:** None

An introduction, practice and an application of storytelling languages and structured craft approach; including the art of storytelling, elements and structure of a story, narrative techniques, story development in multiple film and media-related platforms; the creative application to any of the following screenwriting, short films, television, and/or design related outcomes, such as campaigns, posters, adverts, applications, products, etc.

#### **ICFA 336 Cinematic Language and Its Application**

**4 (4-0-8)**

**Prerequisite:** None

An introduction, practice and an application of languages to critical thinking and analysis; examine key film languages and textual examples, including narrative theories; genre, film theories; an analysis of key film texts; the development of skills in research, writing and analytical thinking; applied knowledge to creative works. The presentation of original ideas and reflection on craft approach

#### **ICFA 337 Thai and ASEAN Cinema**

**4 (4-0-8)**

**Prerequisite:** None

An introduction, practice and an application of languages to critical thinking and analysis of Thai and ASEAN film texts; examine key film languages and textual examples, including narrative theories; genre, film theories; an analysis of key film texts; the development of skills in research, writing and analytical thinking

#### **ICFA 338 Short Film Production**

**4 (2-4-6)**

**Prerequisite:** None

An introduction, practice and an application of short film languages and structured craft approach; including narrative storytelling, filmmaking techniques, and production practices, hands-on film pre-production, production and post; short film, research, analysis, presentation

#### **ICFA 339 Film Genre and Gender**

**4 (4-0-8)**

**Prerequisite:** None

The critical thinking and analysis practice of reading and decoding genre film texts; examine key film languages and textual examples to discuss issues of gender and gender representation, including genre theories; gender theories and film feminism; an analysis of key film texts; the development of skills in research, writing and analytical thinking

#### **ICFS 114 Marketing of Food Product and Services**

**2 (2-0-4)**

**Prerequisites:** None

Principles of marketing with an emphasis on food product; market research and analysis, consumer behaviour and marketing strategies; basic economic principles, marketing analytical tools, trends in processed food and food service industries

**ICFS 115 Operations Management in Food Business**

**2 (2-0-4)**

**Prerequisites:** None

The main factors affecting the performance in the food industry, matching of supply and demand, eliminating inefficiencies, increasing productivity and utility, cost control including the return on investment (ROI) and the cost of goods sold (COGS) calculation

**ICFS 114 Marketing of Food Product and Services**

**2 (2-0-4)**

**Prerequisites:** None

Principles of marketing with an emphasis on food product; market research and analysis, consumer behaviour and marketing strategies; basic economic principles, marketing analytical tools, trends in processed food and food service industries

**ICFS 116 Food for Specialised Diets**

**4 (3-2-7)**

**Prerequisites:** None

Explore the principles and techniques to create foods that meet the needs of individuals with specialised dietary preference or requirement such as gluten-free, low-sodium, vegetarian and vegan, etc. with practical exercises included

**ICFS 117 Food Product and Process Design**

**4 (4-0-8)**

**Prerequisites:** None

Food processing; design new food product processing; evaluation of the new product characteristics to target consumers

**ICFS 118 Food Safety and Sanitation Management**

**4 (4-0-8)**

**Prerequisites:** None

Basic knowledge of food safety and sanitation including foodborne illness, elements of safe food, personal hygiene, hygienic food handling; food safety and sanitation approaches

**ICFS 119 Quality System in Food Processing OR ICFS 366 Consultancy and Auditing in Food Quality and Safety Management**

**4 (4-0-8)**

**Prerequisites:** None

Food quality and safety system standards; principles and guides for food quality and safety management system auditing; case study from the past experience of professional consultants and auditors

#### **ICFS 120 Science of Thai Culinary Arts**

**4 (3-2-7)**

**Prerequisites:** None

Scientific aspects of common ingredients, taste and flavours of Thai cuisine; scientific explanation behind local wisdoms of techniques in Thai cuisine; health benefit potentials of Thai cuisines; laboratory sessions on techniques of Thai cuisine processing for dishes such as stir-fried, steamed, spicy salads, curry, and desserts

#### **ICFS 121 Food Product Innovation**

**4 (4-0-8)**

**Prerequisites:** None

Agri-food system innovation; innovation in food product development including novel products, product improvements, functional ingredients, and functional foods; innovation in food industry processing such as technologies and packaging; innovation in the cooking sector in regards to molecular gastronomy and science-based cooking

#### **ICFS 122 Trends in Food Science and Technology**

**2 (2-0-4)**

**Prerequisites:** None

Emerging trends in food science and technology, their potential and application in food production. Insights into how these advancements can address challenges in food industry

#### **ICFS 171 Discovering Culinary Techniques**

**4 (2-4-6)**

**Prerequisites:** None

Principles of mise en place (preparation before cooking), proper culinary terminology; developing standardized recipes, practical sessions on basic cooking method both with dry heat and moist heat; developing knife skills, the proper use of ingredients

#### **ICFS 172 World Cuisines**

**4 (2-4-6)**

**Prerequisites:** None

Global history of food, geographical and cultural influences on major food ingredients, global influences on contemporary cuisines, practical exercise on dishes preparations of classical, Western, Eastern, Mediterranean, and Oriental cuisines; identifying some culinary trends; fusion cuisine

**ICFS 366 Consultancy and Auditing in Food Quality and Safety Management** 4 (4-0-8)

**Prerequisites:** None

Basic knowledge in consultation; food quality and safety system standards; principles and guides for food quality and safety system auditor in line with ISO 19011; case study from the past experience of professional consultants and auditors; ethics in conducting consultancy and auditing as per the food safety management system

**ICFS 374 Experimental Design in Food Product Development** 2 (1-2-3)

**Prerequisites:** ICMA 151 Statistics for Science I

The fundamental concept of experimental design for food product development: randomisation, replication, blocking; Experimental designs for various stages of food product development: formulation optimisation, sensory evaluation; Common statistical analysis for food product development: T-Test, ANOVA, response surface methodology, etc. with practical exercises

**ICFS 412 Product Development for Food and Food Service Industry** 4 (3-2-7)

**Prerequisites:** ICFS 317 Food Chemistry, ICFS 341 Food Processing

Principles and steps used in a new product-developing process, formulation, level of new product, product cycle, types of product development and related techniques, sensory evaluation techniques of food products, product development for food service; practical exercises included

**ICFS 418 Fruits and Vegetables Technology** 4 (3-2-7)

**Prerequisites:** ICFS 317 Food Chemistry, ICFS 341 Food Processing

Characteristics, composition, and the nutritional importance of fruit and vegetables; post-harvest handling and changes and in the product quality; preservations and processing technologies applied to fruits and vegetables; the production of fresh and manufactured food products and ingredients from fruits and vegetables; the by-products utilization and waste management of fruit and vegetables processing; practical exercises included

**ICFS 422 Dairy Product Technology** 4 (3-2-7)

**Prerequisites:** ICFS 317 Food Chemistry, ICFS 341 Food Processing

The composition and properties of milk, physical and chemical changes occurring in milk during processing and storage, milk processing i.e. fluid milk; fermented products, concentrated and dried dairy products,

butter, cream frozen dairy desserts; milk microbiology and microbial transformations of milk, food safety aspects, functional health benefits; practical exercises included

#### **ICFS 423 Beverage Technology**

**4 (3-2-7)**

**Prerequisites:** ICFS 317 Food Chemistry, ICFS 341 Food Processing

Characteristics and production technology of non-alcoholic and alcoholic beverages such as soft drinks, fruit juices, teas, coffee, and alcoholic beverages; ingredient selection and formulation; manufacturing processes, quality control, packaging, sensory evaluation, and market trends; practical exercises included

#### **ICFS 424 Fat and Oil Technology**

**4 (3-2-7)**

**Prerequisites:** ICFS 317 Food Chemistry, ICFS 341 Food Processing

Processing and technologies of edible fats and oils; physical and chemical properties of both raw materials and finished products such as salad dressing, margarines, butters and other types of fat and oil product; quality, safety, and nutritional aspects of fat and oil products; practical exercises included

#### **ICFS 426 Bakery Product Technology**

**4 (3-2-7)**

**Prerequisites:** ICFS 317 Food Chemistry, ICFS 341 Food Processing

Properties and chemistry of flour, ingredients technology and selection, the science of mixing and baking; functional bakery products, sensory attributes of bakery products, packaging and shelf-life extension of finished products; practical exercises for skill development in bread, cake, and pastry making and formulation balance and adjustment

#### **ICFS 427 Confectionery and Chocolate Product Technology**

**4 (3-2-7)**

**Prerequisites:** ICFS 317 Food Chemistry, ICFS 341 Food Processing

Types of confectioneries, sugar and corn syrup chemistry, common ingredients in sugar-based confectionery and their properties in candy-making, candy processing technology, types of sugar-based confectioneries: crystalline and non-crystalline candies, aerated confection; cocoa beans processing, chocolate-based confectionery, chocolate processing, tempering, panning and shell moulding, chocolate properties; Practical sessions included

#### **ICFS 432 Sensory Evaluation of Food Products**

**4 (3-2-7)**

**Prerequisites:** ICFS 317 Food Chemistry

Sensory evaluation theories and practices through descriptive analysis; analytical instrumental methods of sensory evaluation and correlation with consumer sensory evaluation; anatomy and physiology of sensory

systems (sight, taste, smell, touch, and hearing); physiological and psychological factors affecting performance on sensory tests; practical exercises included

**ICFS 437 Application of Modern Biotechnology to Food Products** **4 (3-2-7)**

**Prerequisites:** ICFS 231 General Microbiology

Potential benefits and risks of biotechnology in foods; GMOs, GM foods and food security; current use, research, and development of foods produced through modern biotechnology; practical exercises included

**ICFS 438 Cereal and Starch Technology** **4 (3-2-7)**

**Prerequisites:** ICFS 317 Food Chemistry

Fundamental structure, chemistry, functional properties of cereal and starches; cereal and starch based human food products; their utilization in applications of healthy and functional foods; practical exercises included

**ICFS 452 Food Packaging** **4 (3-2-7)**

**Prerequisites:** ICFS 342 Food Storage and Shelf-life Extension

Materials, systems, and applications of food packaging materials and methods; properties, fabrication, and functions of metal, glass, paper, and plastic packaging; sanitation of packaging materials; forming, filling, joining, and enclosure operations and related equipment for packaging systems and equipment; selected topics for food packaging applications including aseptic packaging, food-package interactions, sealing integrity, handling of packages, and modified atmospheric packaging; practical exercises included

**ICFS 463 Field Trip** **2 (0-6-2)**

**Prerequisites:** ICFS 341 Food Processing

Visits and industrial plant studies of food manufacturing industry or related organizations

**ICFS 471 Trends and Novel Techniques of World Foods and Cuisines** **4 (3-2-7)**

**Prerequisites:** ICFS 317 Food Chemistry

The latest trends in world food and cuisine, future food and cuisine, and innovative techniques from various world cuisines; role of technology in modern food and cuisine; practical sessions

**ICFS 473 Special Topic in Food Science and Technology** **4 (4-0-8)**

**Prerequisites:** ICFS 317 Food Chemistry **OR** ICFS 341 Food Processing **OR** ICFS 333 Food Microbiology

Exploration of contemporary and emerging issues in food science and technology of the selected topics and their importance and application in food industry and food science and technology field

#### **ICGL 101 Elementary German I**

**4 (4-0-8)**

**Prerequisites:** Placement Test

Greetings, introducing oneself or others, German alphabet and phonemes, personal information, numbers from 1 – 100 and price quotations, expressing wishes, telling the time and making appointments, quality of items, measurements; verb forms, pronouns, sentence structure, gender of nouns, accusative case and plural forms, negation

#### **ICGL 102 Elementary German II**

**4 (4-0-8)**

**Prerequisites:** Placement Test or ICGL 101 Elementary German I

Ordering and paying for meals in a restaurant, preferences of food and drinks, giving and asking for directions, reading a map, preferences of work conditions, job advertisements; essay writing, yes/no questions, imperative forms, compound verbs, preposition with dative case, modal verbs I, German sentence bracket

#### **ICGL 103 Elementary German III**

**4 (4-0-8)**

**Prerequisites:** Placement Test or ICGL 102 Elementary German II

Health advice and problems, healthy and unhealthy lifestyles, events and accidents, travel reports, curriculum vitae (CV); possessive articles in nominative, accusative and dative case, perfect tense, connectors, modal verbs II

#### **ICGL 111 Elementary Japanese I**

**4 (4-0-8)**

**Prerequisites:** Placement test

Hiragana and Katakana characters; fundamentals of basic Japanese grammar (noun-ending sentences, particles, demonstratives, verb-ending sentences, non-past and past tenses); scaffolding of basic vocabulary; basic communication about personal topics (self and others); description of Japan; designing written products in the target language; expressing existence, preferences, and agreement; comparing cultures

#### **ICGL 112 Elementary Japanese II**

**4 (4-0-8)**

**Prerequisites:** ICIC 111 Elementary Japanese I - Language and Culture

Kanji characters (approximately 50); fundamentals of basic Japanese grammar concepts (particles, verbs of giving and receiving, na-adjective-ending sentences, i-adjectives-ending sentences, non-past and past tenses, and classifiers); scaffolding of basic vocabulary; basic communication about daily life topics; designing

written products in the target language; expressing simply points of view, describing people and daily life activities; comparing cultures

### **ICGL 113 Elementary Japanese III**

**4 (4-0-8)**

**Prerequisites:** ICIC 112 Elementary Japanese II - Language and Culture

Kanji characters (approximately 50); fundamentals of basic Japanese grammar concepts (verb conjugation (masu-form, te-form, nai-form, and dictionary form), and related sentence patterns; polite style of speech, and plain style of speech, particles); scaffolding of basic vocabulary; basic communication about various topics; designing written products in the target language; expressing points of view, describing people and various activities; comparing cultures

### **ICGL 121 Elementary French I**

**4 (4-0-8)**

**Prerequisites:** Placement test

Fundamentals of basic French grammar (pronouns, present tense conjugation, gender/number, adjectives, prepositions); scaffolding of basic vocabulary; basic communication about personal topics (self and others); identifying and describing French speaking countries; designing written products in the target language; expressing existence, preferences and agreement; comparing cultures

### **ICGL 122 Elementary French II**

**4 (4-0-8)**

**Prerequisites:** ICIC 121 Elementary French I - Language and Culture

Fundamentals of basic French grammar (present and future tense, adjective gender, place & agreement, more complex prepositions, more complex questions); scaffolding of simple vocabulary; simple communication about daily life topics (in France and in their country); designing written products in the target language; expressing simply point of view, describing people and daily life activities; comparing cultures

### **ICGL 123 Elementary French III**

**4 (4-0-8)**

**Prerequisites:** ICIC 122 Elementary French II - Language and Culture

Fundamentals of more complex French grammar (present and future tense, adjective gender, place & agreement, more complex prepositions, questions and past tense notions); scaffolding of more complex vocabulary; longer communication about daily life topics (in France and in their country); designing written products in the target language; expressing point of view, describing people and daily life activities; comparing cultures

### ICGL 131 Elementary Chinese I

4 (4-0-8)

**Prerequisites:** Placement test

The Chinese phonetic system (Pinyin); the Chinese basic writing system (Stroke order); Chinese characters (approximately 100); fundamentals of basic Chinese grammar (interrogative pronouns, the 的 particle, yes/no questions with 吗, demonstrative pronouns, classifiers, adverbs 也, 都); scaffolding of basic vocabulary; basic communication about personal topics (self and others); describing China; designing written products in the target language; expressing existence, preferences and agreement; comparing cultures

### ICGL 132 Elementary Chinese II

4 (4-0-8)

**Prerequisites:** ICIC 131 Elementary Chinese I - Language and Culture

The Chinese phonetic system (Pinyin); the Chinese writing system; Chinese characters (approximately 100); fundamental Chinese grammar concepts (interrogative pronouns, classifiers, the “的” particle, “的” phrases, adverbials, continuous action sentence structures and reduplication of verbs); scaffolding of basic vocabulary; basic communication about daily life topics; designing written products in the target language; expressing simply points of view, describing people and daily life activities; comparing cultures

### ICGL 133 Elementary Chinese III

4 (4-0-8)

**Prerequisites:** ICIC 132 Elementary Chinese II - Language and Culture

Chinese phonetics (Pinyin); Chinese characters (approximately 150); Fundamentals of basic Chinese grammar concepts (interrogative pronouns, modal verbs, complex sentences, the modal particle “le” (了), complements of state, complements of result, complements of duration); scaffolding of basic vocabulary; basic communication about various topics; designing written products in the target language; expressing points of view; telling directions; describing oneself and other people's abilities; comparing cultures

### ICGL 141 Elementary Spanish I

4 (4-0-8)

**Prerequisites:** Placement test

Fundamentals of basic Spanish grammar (pronouns, present tense conjugation, gender/number, adjectives, prepositions); scaffolding of basic vocabulary; basic communication about personal topics (self and others); identifying and describing Spanish speaking countries; designing written products in the target language; expressing existence, preferences and agreement; comparing cultures

### ICGL 142 Elementary Spanish II

4 (4-0-8)

**Prerequisites:** ICIC 141 Elementary Spanish I - Language and Culture

Fundamentals of basic Spanish grammar (pronouns, present tense conjugation, reflexive verbs, gender/number, adjectives, prepositions); scaffolding of basic vocabulary; basic communication about personal topics (self and others); identifying and describing Spanish speaking countries; designing written products in the target language; expressing existence, preferences and agreement; talking about daily habits

### **ICGL 143 Elementary Spanish III**

**4 (4-0-8)**

**Prerequisites:** ICIC 142 Elementary Spanish II - Language and Culture

Towns, quarters and cities; directions; past experiences; present perfect tense, past tense indefinido; verbs ser, estar and hay; vocabulary of places; time markers for past tense; verbs empezar a+ infinitive; verbs ir / irse

### **ICGL 161 Elementary Thai I**

**4 (4-0-8)**

**Prerequisites:** Placement Test

Listening and speaking skills on the following topics: introducing oneself one's friend and family, basic food and drink ordering, places, directions, transportation, buying tickets, clothing items, colours, and sizes, bargaining, counting and using classifiers, reading and writing Thai consonants, vowels placed after, before, above, and below the consonants, Thai numbers, live and dead syllables

### **ICGL 162 Elementary Thai II**

**4 (4-0-8)**

**Prerequisites:** Placement Test or ICGL 161 Elementary Thai I

Listening and speaking skills on the following topics: one's schedule, making appointments, favorite leisure activities, ordering food, drinks and desserts with special requests, presentation of one's plan for activities during school break, continuation of Elementary Thai I in reading and writing skills, consonant clusters, tone marks, words with special spelling rules, reading short paragraphs

### **ICGL 163 Elementary Thai III**

**4 (4-0-8)**

**Prerequisites:** Placement Test or ICGL 162 Elementary Thai II

Listening and speaking skills on the following topics: going to see the doctor, looking for a house for rent, seasons, travel and festivals

### **ICGL 201 Pre-intermediate German I**

**4 (4-0-8)**

**Prerequisites:** Placement Test or ICGL 103 Elementary German III

Clothing and accessory, appearance, shopping for clothes and accessory family members, present and past families, statistics, festivities and culture, dates, presents; comparative forms of adjectives, modal verbs past tense, dependent clauses (cause and condition), personal pronouns, accusative and dative cases

**ICGL 202 Pre-intermediate German II** **4 (4-0-8)**

**Prerequisites:** Placement Test or ICGL 201 Pre-Intermediate German I

Media usage and Internet-shopping, advertisement, expressing surprise, meeting someone for the first time, country and city life, cultural capitals in Europe; direct and indirect questions, adjective without article, relative clause and pronoun, modal verb in simple past, sub-clause with als

**ICGL 203 Pre-intermediate German III** **4 (4-0-8)**

**Prerequisites:** Placement Test or ICGL 202 Pre-Intermediate German II

Professional biographies, job announcements, festivities and customs, emotions, movie synopsis, products and inventions; reasons with weil and denn, nominalization, preposition with dative, sub-clause with wenn and um zu, passive voice

**ICGL 211 Pre-intermediate Japanese I** **4 (4-0-8)**

**Prerequisites:** ICIC 113 Elementary Japanese III - Language and Culture

Kanji characters (approximately 50); fundamentals of basic Japanese grammar concepts (verb conjugation (masu-form, te-form, nai-form, and dictionary form), and related sentence patterns; polite style of speech, and plain style of speech, particles); scaffolding of basic vocabulary; basic communication about various topics; design of written products in the target language; expressing points of view, describing people and various activities; comparing cultures

**ICGL 212 Pre-intermediate Japanese II** **4 (4-0-8)**

**Prerequisites:** ICIC 211 Pre-Intermediate Japanese I - Language and Culture

50 Kanji characters; explaining the state of things; describing necessary things to do in advance as preparations for the future; expressing own intentions, plans, and schedule; expressing own guess and inference; asking someone to take a message or conveying a message; stating standards or norms, when one explains the manner of doing a certain action or work; explaining a condition in which a certain action is performed; stating everyday habitual actions

**ICGL 213 Pre-intermediate Japanese III** **4 (4-0-8)**

**Prerequisites:** ICIC 212 Pre-Intermediate Japanese II - Language and Culture

50 Kanji characters; expressing judgments under certain conditions; stating a purpose or an aim; describing changes in human ability and conditions; describing an action performed by a third person, or an action when one feels annoyed or troubled, using passive verbs; expressing something with the most important information emphasized; describing natural phenomena, happenings, and events, together with their causes; clearly telling what speakers consider as questions, by using a question with an interrogative as a component of a sentence; using appropriate expressions for giving and receiving of things and actions, depending on the relationship between the giver and the receiver, in terms of social status; telling usage, evaluation, necessary time, expense, etc

#### **ICGL 221 Pre-intermediate French I**

**4 (4-0-8)**

**Prerequisites:** ICIC 123 Elementary French III - Language and Culture

Developing further knowledge of French grammar at the pre-intermediate level (present, past and future, more complex interrogative sentence, negative sentence, comparative and pronouns); scaffolding of more complex vocabulary; more complex and longer communication about personal needs, solving simple problems; interacting in predictable context topics in French; designing written products in the target language; expressing points of view, giving simple advices and interacting in daily life activities; comparing cultures

#### **ICGL 222 Pre-intermediate French II**

**4 (4-0-8)**

**Prerequisites:** ICIC 221 Pre-Intermediate French I - Language and Culture

Extending further knowledge of French grammar at the pre-intermediate level (hypotheses and conditions, future, conditional, pronouns, direct and indirect speech, imperative and gerundive); scaffolding of more complex vocabulary; longer communication about solving problems and expressing feelings; commenting on attitudes and justifying actions in predictable context topics in French; comparing cultures

#### **ICGL 223 Pre-intermediate French III**

**4 (4-0-8)**

**Prerequisites:** ICIC 222 Pre-Intermediate French II - Language and Culture

Developing further knowledge of French grammar at the pre-intermediate level (comparative, complex interrogative sentence, gerundive, subjunctive present in regular and irregular forms, passive voice); scaffolding of more complex vocabulary; longer communication about personal feelings, wishes and hopes; complaining and talking about difficulties, suggesting solutions; comparing cultures

#### **ICGL 231 Pre-intermediate Chinese I**

**4 (4-0-8)**

**Prerequisites:** ICIC 133 Elementary Chinese III - Language and Culture

Chinese characters (approximately 300); identifying pre-intermediate level Chinese grammar concepts (complements of duration, expressing approximate numbers, comparative sentences, complements of quantity, exclamatory sentences); developing listening, speaking, reading and writing skills through an integrated approach; communication about various topics; comparing two cities in various aspects; comparing the seasons in China and Thailand; activities and festivals in each season; organizing a trip

**ICGL 232 Pre-intermediate Chinese I**

**4 (4-0-8)**

**Prerequisites:** ICIC 231 Pre-Intermediate Chinese I - Language and Culture

Chinese characters (approximately 300); identifying pre-intermediate level Chinese grammar concepts (past experiences, complements of frequency, the structure of 是.....的, reduplication of adjectives, S-P phrases, complements of result II, simple passive sentences); developing listening, speaking, reading and writing skills through an integrated approach communication about various topics; sports or entertainment; expressing unlucky stories; describing appearance and clothes; Chinese style weddings (1)

**ICGL 233 Pre-intermediate Chinese I**

**4 (4-0-8)**

**Prerequisites:** ICIC 232 Pre-Intermediate Chinese II - Language and Culture

Chinese characters (approximately 300); identifying pre-intermediate level Chinese grammar concepts (continuous actions or states, Chinese style weddings, Chinese construction quadrangles, existence emergence sentences, “把” sentence I, “把” sentence II, “被” sentence, adverb “又”); developing listening, speaking, reading and writing skills through an integrated approach; communication about various topics; travelling by airplane; Beijing Opera performances; outdoor activities; reunions with old friends

**ICGL 241 Pre-intermediate Spanish I**

**4 (4-0-8)**

**Prerequisites:** ICIC 143 Elementary Spanish III - Language and Culture

Habits; pronominal verbs; porque/para; furniture and parts of the house; appearance; family, irregular verbs in present tense; present progressive

**ICGL 242 Pre-intermediate Spanish II**

**4 (4-0-8)**

**Prerequisites:** ICIC 241 Pre-Intermediate Spanish I - Language and Culture

Leisure activities; intentions and projects; pain, discomfort and symptoms; parts of the body; vocabulary of food; ir a+ infinitive; present perfect; differences between ser and estar; personal pronouns for objects; verb gustar

**ICGL 243 Pre-intermediate Spanish III** **4 (4-0-8)**

**Prerequisites:** ICIC 242 Pre-Intermediate Spanish II - Language and Culture

Past habits, customs and circumstances; past and present actions; advice, instructions (imperative); future situations and actions, conditions, hypotheses; past experience; imperfect verb tense; indefinido verb tense; present perfect verb tense; contrast of past tenses

**ICIC 251 Contemporary Southeast Asia: Cultural Studies** **4 (4-0-8)**

**Prerequisites:** None

An introduction to Southeast Asia (SEA) and its extraordinary diversity through the humanities, the arts and social sciences; emphasis on the intellectual and practical challenges linked to modernization and development; a study of the ways SEA-member states cope with the social, cultural, economic, political and religious issues brought about by globalization

**ICIC 252 Formal Reasoning: Human and Artificial** **4 (4-0-8)**

**Prerequisites:** None

Logic and reasoning itself as a field of study; topics including formalization of propositions, arguments, proofs, puzzles, and predicates; logic as indispensable to understanding human language and thought; logic as a foundation for the language of animals and computers as well as artificial intelligence

**ICIC 253 Value Studies** **4 (4-0-8)**

**Prerequisites:** None

An introduction to value theory from a philosophical, sociological and economic perspective focusing on the interplay between value and culture; exposure to a wide array of theoretical approaches to the problematic relationship between the descriptive and the normative; considered as an introduction to Ethics, Philosophy and Economics Concentration

**ICIC 258 Language: The Human Essence** **4 (4-0-8)**

**Prerequisites:** None

A presentation of the primary areas of study in linguistics, including theoretical, biological, structural, psychological, social, and historical aspects of language; a focus on some of the greatest questions within the field of linguistics, such as 'What is language?', 'How does language work in the brain?', 'How does language operate as a system?', 'How does language develop?', 'How does language function in society?', or 'How does language change over time?'; topics including the nature of human language, grammatical aspects of language, the psychology of language, and language and society

Chinese characters (approximately 300); identifying pre-intermediate level Chinese grammar concepts (complements of duration, expressing approximate numbers, comparative sentences, complements of quantity, exclamatory sentences); developing listening, speaking, reading and writing skills through an integrated approach; communication about various topics; comparing two cities in various aspects; comparing the seasons in China and Thailand; activities and festivals in each season; organizing a trip

#### **ICGL 232 Pre-intermediate Chinese II**

**4 (4-0-8)**

**Prerequisites:** ICIC 231 Pre-Intermediate Chinese I - Language and Culture

Chinese characters (approximately 300); identifying pre-intermediate level Chinese grammar concepts (past experiences, complements of frequency, the structure of 是.....的, reduplication of adjectives, S-P phrases, complements of result II, simple passive sentences); developing listening, speaking, reading and writing skills through an integrated approach communication about various topics; sports or entertainment; expressing unlucky stories; describing appearance and clothes; Chinese style weddings (1)

#### **ICGL 233 Pre-intermediate Chinese III**

**4 (4-0-8)**

**Prerequisites:** ICIC 232 Pre-Intermediate Chinese II - Language and Culture

Chinese characters (approximately 300); identifying pre-intermediate level Chinese grammar concepts (continuous actions or states, Chinese style weddings, Chinese construction quadrangles, existence emergence sentences, “把” sentence I, “把” sentence II, “被” sentence, adverb “又”); developing listening, speaking, reading and writing skills through an integrated approach; communication about various topics; travelling by airplane; Beijing Opera performances; outdoor activities; reunions with old friends

#### **ICGL 241 Pre-intermediate Spanish I**

**4 (4-0-8)**

**Prerequisites:** ICIC 143 Elementary Spanish III - Language and Culture

Habits; pronominal verbs; porque/para; furniture and parts of the house; appearance; family, irregular verbs in present tense; present progressive

#### **ICGL 242 Pre-intermediate Spanish II**

**4 (4-0-8)**

**Prerequisites:** ICIC 241 Pre-Intermediate Spanish I - Language and Culture

Leisure activities; intentions and projects; pain, discomfort and symptoms; parts of the body; vocabulary of food; ir a+ infinitive; present perfect; differences between ser and estar; personal pronouns for objects; verb gustar

**ICIC 259 Intercultural Communication****4 (4-0-8)****Prerequisites:** None

A survey of cultural dimensions making up one's cultural identity; an exploration of cultural dynamics enabling or inhibiting communication

**ICIC 301 Intermediate German I - Language and Culture****4 (4-0-8)****Prerequisites:** ICIC 203 Pre-Intermediate German III - Language and Culture

Time, German history, problems in everyday life, advice, men and women, gender issues, vicissitude of work; nominalization with zum, past tense of irregular verbs, subjunctive II, modal verb können, müssen, sollen, adjective after articles

**ICIC 302 Intermediate German II - Language and Culture****4 (4-0-8)****Prerequisites:** ICIC 301 Intermediate German I - Language and Culture

School and education, climate, environment, behavior and manner, conflicts; subjunctive II of werden, haben, sein, future tense, wegen + Genitive case, correlative conjunctions, sub-clause with obwohl, past perfect tense

**ICIC 303 Intermediate German III - Language and Culture****4 (4-0-8)****Prerequisites:** ICIC 302 Intermediate German II - Language and Culture

Generations, narration of events, family relations, literary texts, migration to and from Germany, Europe; possessive article with Genitive, sub-clause, passive voice, question pronouns, verbs with prepositions

**ICIC 311 Intermediate Japanese I - Language and Culture****4 (4-0-8)****Prerequisites:** ICIC 213 Pre-Intermediate Japanese III - Language and Culture

50 Kanji characters; telling a supposition based on the appearance of a thing, person and scene; expressing that the degree of an action or a state is excessive; describing the easiness or difficulty in handling or doing something; expressing feelings of surprise, disappointment or dissatisfaction when an expected consequence did not follow; describing how to cope with a situation or its consequence under a hypothetical situation; telling an action, stressing a certain point in time during the course of the action; expressing that one is convinced and certain of what he/she states; giving compulsion and permission; seeking permission politely; understanding Japanese views on relationships based on seniority, social status and insider/outsider relationships; understanding the entire system of all respectful expressions and humble expressions

**ICIC 312 Intermediate Japanese II - Language and Culture** **4 (4-0-8)**

**Prerequisites:** ICIC 311 Intermediate Japanese I - Language and Culture

50 Kanji characters; explaining cultural aspects; discussing natural disasters; comparing education systems; understanding and presenting graphs and charts; talking about health

**ICIC 313 Intermediate Japanese III - Language and Culture** **4 (4-0-8)**

**Prerequisites:** ICIC 312 Intermediate Japanese II - Language and Culture

50 Kanji characters; reporting about inventions; discussing issues related to natural environments; understanding cultural differences; discussing social issues

**ICIC 321 Intermediate French I - Language and Culture** **4 (4-0-8)**

**Prerequisites:** ICIC 223 Pre-Intermediate French III - Language and Culture

Fundamentals of more complex French grammar; developing further skills to understand French more complex grammar concepts (future and conditional mood, past tenses: imparfait, passé composé, plus-que-parfait, imperative mood; negative patterns, prepositions of time, adjective gender, place & agreement, more complex sentences); scaffolding of more complex vocabulary; longer communication about daily life topics (in France and in their country); designing written products in the target language; expressing points of view, advising people, describing people and daily life activities; talking about family and recounting personal memories; comparing cultures

**ICIC 322 Intermediate French II - Language and Culture** **4 (4-0-8)**

**Prerequisites:** ICIC 321 Intermediate French I - Language and Culture

Fundamentals of more complex French grammar; developing further skills to understand French more complex grammar concepts (indicating origin and duration of and action with prepositions to express moments and duration (1), gerundive forms, purpose clauses, opposition and concession words, the passive voice, relative pronouns, the subjunctive mood); scaffolding of more complex vocabulary; longer communication about daily life topics (in France and in their country); designing written products in the target language; expressing points of view, advising people; describing people and daily life activities; talking about family and recounting personal memories; comparing cultures

**ICIC 323 Intermediate French III - Language and Culture** **4 (4-0-8)**

**Prerequisites:** ICIC 322 Intermediate French II - Language and Culture

Developing further knowledge of the grammar; developing further knowledge of vocabulary leading students to the intermediate level of proficiency; developing listening, speaking, reading and writing skills through an integrated approach; producing oral and short paragraph-text; writing email and letters asking information; reading and commenting on short newspapers or website articles; comparing cultures

#### ICIC 331 Intermediate Chinese I - Language and Culture

4 (4-0-8)

**Prerequisites:** ICIC 233 Pre-Intermediate Chinese III - Language and Culture

Chinese characters (approximately 300) ; intermediate level Chinese grammar concepts (the flexible use of interrogative pronouns, complex sentences without connectives, complements of state(2), rhetorical questions, emphasizing affirmation, double negatives, conjunctions: 连...也, 都, phrases: 一边..., 一边..., 先..., 再..., 然后..., 最后...); scaffolding of advanced vocabulary; communication about various topics; designing written products in the target language; expressing feelings of sorrow and grievance; planning a trip; ordering dishes; Chinese food culture; comparing cultures

#### ICIC 332 Intermediate Chinese II - Language and Culture

4 (4-0-8)

**Prerequisites:** ICIC 331 Intermediate Chinese I - Language and Culture

Chinese characters (approximately 300) ; Chinese grammar concepts (the limitedness in amount or degree 一点儿也不/没, an adverbial phrase suggesting of an exaggeration in tone 简直, usage of 至于 to bring in another topic, usage of “verb+ 了” as a complement of result to indicate completion of an act or accommodation of something, usage of “一+verb” in indicating an outcome result or a conclusion); scaffolding of vocabulary; communication about various topics; designing written products in the target language; expressing one’s ideals and reasons; cultural conflicts; comparing cultures

#### ICIC 333 Intermediate Chinese III - Language and Culture

4 (4-0-8)

**Prerequisites:** ICIC 332 Intermediate Chinese II - Language and Culture

Chinese characters (approximately 300) ; Chinese grammar concepts (complex sentence structures: 总而言之, 哪怕, 好在, 反而, 一...就是; expressing necessity and obligation by using 总得; adverbials 甚至, 却, 曾经, 到底, 下, 不管...都/也); scaffolding of vocabulary; communication about various topics; designing written products in the target language; interviewing a certain group of people according to a specific topic; expressing one’s anger and dissatisfaction; persuading people; expressing a clear definition of a certain value; presenting a certain product

**ICIC 341 Intermediate Spanish I - Language and Culture****4 (4-0-8)****Prerequisites:** ICIC 243 Pre-Intermediate Spanish III - Language and Culture

Elements of intermediate grammar and vocabulary related to specialized contexts; discussions on specific topics; expressing opinions and asking for clarification in such context; reading a wider variety of long texts, and writing extended letters or narrative

**ICIC 342 Intermediate Spanish II - Language and Culture****4 (4-0-8)****Prerequisites:** ICIC 341 Intermediate Spanish I - Language and Culture

Expressing desire, complaints and necessity; telling anecdotes; expressing cause and effect; expressing interests and feelings; present subjunctive; talking about personal relationships; disagreement in formal and informal situations; easing a disagreement; describing specifications and how something works

**ICIC 343 Intermediate Spanish III - Language and Culture****4 (4-0-8)****Prerequisites:** ICIC 342 Intermediate Spanish II - Language and Culture

Making hypotheses and conjectures; relating mysterious incidents; writing a news article; referring to a news article and commenting on it; giving advice; evoking imaginary situations; expressing an opinion about actions and behaviors; expressing opinions and desire; narrating events in the past; future tense; using subjunctive present; past tenses; passive voice; mass media vocabulary

**ICIC 351 Thinking the Other****4 (4-0-8)****Prerequisites:** ICIC 259 Intercultural Communication OR PD approval

An exploration of the notion of alterity from Antiquity to the colonial period focusing on the Age of Exploration; the idea of 'otherness' throughout history, conflicts between cultures, the debate about race; a variety of discourses revealing perspectives and attitudes towards other cultures during periods of conquests, including the Greco-Roman, Christian and Islamic, Mongol, as well as European phases of expansion, culminating in the encounters between dominant and indigenous cultures during voyages of discovery

**ICIC 355 Judgment and Decision Making****4 (4-0-8)****Prerequisites:** ICIC 254 History of Ideas I OR PD approval

A discussion on the decision-making theories and the characteristic of human judgments in normative, psychological and sociological terms; highlighting the problematic interplay between business practices and ethical thought with regard to the notion of rationality

**ICIC 356 Ethics and Politics****4 (4-0-8)****Prerequisites:** ICIC 254 History of Ideas I **OR** PD approval

Ideas of political philosophy based on some classical texts and contemporary approaches; focusing on general questions of ethics through the lens of justice; discussions of ethical questions regarding how persons ought to be governed/or if they ought to be governed at all (the justification of the authority of the state), the relationship of freedom and autonomy, and exploring the nature of a fair state, a good ruler and a just international order; concepts learned tested in light of current political, ecological and economic issues

**ICIC 357 Philosophy of Economics****4 (4-0-8)****Prerequisites:** ICIC 254 History of Ideas I **OR** PD approval

A survey of conceptual and methodological issues raised in modern economics including choice, rationality and irrationality, the fact/value distinction, realism and antirealism, the relationship between microeconomics and macroeconomics, prediction, causality and policymaking, pricing and utility; case studies involving the application to economic problems

**ICIC 358 Behavioral Economics****4 (4-0-8)****Prerequisites:** ICIC 254 History of Ideas I **OR** PD approval

An examination of the intersection of psychology, neuroscience and economic thought; incorporating contemporary ideas of human behavior in the context of economic systems as an effort to overcome the absence of factors affecting human judgment in classical economics; a complement to classical economic theory and a demonstration on how economic theory can be adapted to work in government decision-making and company organization

**ICIC 364 Literary Theory and Criticism****4 (4-0-8)****Prerequisites:** ICIC 259 Intercultural Communication **OR** PD approval

A survey of developments in literary theory from the twentieth century to the present, from Formalism and New Criticism through to Post-colonial and Feminist Criticism and Gender Studies; a knowledge of a number of theoretical perspectives to enable students to evaluate and comment on literary works from a number of genres and cultural contexts

**ICIC 366 Popular Culture****4 (4-0-8)****Prerequisites:** ICIC 259 Intercultural Communication **OR** PD approval

An introduction to a variety of analytical and critical strategies for reading, viewing, and understanding trends in popular mainstream culture; honing critical thinking skills by using popular culture texts in books, television, film, and new media; looking at a variety popular texts and analyzing what current trends and anxieties these texts represent and market to consumers

**ICIC 367 Narratives, Nations, and Nationalism**

**4 (4-0-8)**

**Prerequisites:** ICIC 259 Intercultural Communication **OR** PD approval

A survey of how grand narratives are created, used, and propagated; a critical analysis of how the stories of a nation foster feelings of nationalism, patriotism, and xenophobia

**ICIC 368 Language, Power and Culture**

**4 (4-0-8)**

**Prerequisites:** ICIC 259 Intercultural Communication **OR** PD approval

An exploration of some contributions made to the understanding of language by social sciences, in particular: Anthropology, Sociology and Cultural Psychology; providing insights on a range of themes related to language (and in particular to English); an exploration of the cultural dimensions of language and its role in 'socially constructing' lived reality, i.e. written vs. spoken word; inherent power-discourses in language (focusing on English in the past, present and future); and the connection between language and national identity

**ICIC 369 Humanity Today: Between Science and Fiction**

**4 (4-0-8)**

**Prerequisites:** ICIC 259 Intercultural Communication **OR** PD approval

An analysis of the increasing symbiosis between science and fiction; an exploration of questions concerning human existence at the heart of science fiction storytelling; science fiction as a form of storytelling using a sense of wonder at reality, the same wonder that scientific exploration engenders; a combination of lectures, group work, films, novels and short stories covering a wide range of topics such as artificial intelligence, genetic engineering, space exploration, robotics, and transhumanism

**ICIC 371 Minds and Machines**

**4 (4-0-8)**

**Prerequisites:** ICIC 254 History of Ideas I **OR** PD approval

An overview of central issues in the philosophy of mind and their application to technological innovation and ethics; issues to be discussed include: What is thought? Is the mind immaterial, is it equivalent to the brain or neither? Does an account of thought also explain consciousness, emotion and/or self-knowledge? Is there reason to suppose that machines could not eventually think, feel, emote, reflect or behave morally?

What can artificial intelligence tell us about who and what we are?; readings derived from both historical and contemporary sources

**ICIC 372 From Modernism to Postmodernism**

**4 (4-0-8)**

**Prerequisites:** ICIC 254 History of Ideas I OR PD approval

An introduction to the philosophical and cultural movement of modernism and postmodernism; tracing the roots of modernism to the European Enlightenment and discussing the earliest criticism to the 'Age of Reason'; understanding attempts by contemporary critics who reconceptualized a number of concepts such as subjectivity, progress, empiricism and the rule of law; a discussion on how their efforts lead to a major shift in the way discourse, ideas and cultural developments are treated in the 20th century

**ICIC 373 Reason and Passion: The Philosophy of Emotion**

**4 (4-0-8)**

**Prerequisites:** ICIC 254 History of Ideas I OR PD approval

An exploration of philosophical and psychological accounts of emotion; topics including the nature of emotion, its relationship to reason, its influence on thought, judgment and action, and its role in the evaluation of oneself and others; using readings from both historical and contemporary sources

**ICIC 375 Behavior, Ethics and Technology**

**4 (4-0-8)**

**Prerequisites:** ICIC 254 History of Ideas I OR PD approval

An analysis of the contemporary interplay between science, technology and ethics with a focus on key questions related to autonomy, deliberation and responsibility; eyeing on both modern bioscience and the technological transformation of daily life in analyzing an increasingly dynamic notion of human nature and addressing groundbreaking insights into the functioning of human motivation

**ICIC 376 Information, Knowledge, Representation**

**4 (4-0-8)**

**Prerequisites:** ICIC 254 History of Ideas I OR PD approval

A survey of theoretical principles and practical tools regarding the nature of systematic knowledge, its variation, processing and communication; scrutinizing selected problems in epistemology and ontology on the backdrop of developments in symbol theory, cognitive science and Artificial Intelligence

**ICIC 380 Postcolonialism**

**4 (4-0-8)**

**Prerequisites:** ICIC 259 Intercultural Communication OR PD approval

An introduction to the study and appreciation of post-colonial literature; utilizing literature, music and film to help students develop the ability to understand influences in new ways; an evaluation through a combination of mock trials, debates, plays, presentations, reading notes and essays

**ICIC 381 Selected Topics in Literary and Cultural Studies**

**4 (4-0-8)**

**Prerequisites:** ICIC 259 Intercultural Communication OR PD approval

An exploration of unique areas of research that are emerging in literary and cultural studies today; developing insights into sub-disciplinary specialization; investigating discrete areas of cultural inquiry in their relationship to other disciplines; carrying out critical interventions in subfields of literary and cultural studies

**ICIC 401 Advanced German I – Language and Culture**

**4 (4-0-8)**

**Prerequisites:** ICIC 303 Intermediate German III - Language and Culture

Analyzing and making use of linguistic, historical, social and cultural perspectives evolving over time in Germany and the German-speaking world; developing and demonstrating an understanding of ideas and current issues of global significance through a large variety of activities in related topics at the advanced German language proficiency level

**ICIC 402 Advanced German II - Language and Culture**

**4 (4-0-8)**

**Prerequisites:** ICIC 401 Advanced German I – Language and Culture

Developing linguistic and cultural abilities to conduct communication exchanges in German language at the advanced level in today's workplace; acquiring a range of soft skills to communicate effectively in professional environments; developing a knowledge of job markets, career paths and opportunities for German language speakers

**ICIC 411 Advanced Japanese I – Language and Culture**

**4 (4-0-8)**

**Prerequisites:** ICIC 313 Intermediate Japanese III - Language and Culture

Analyzing and making use of linguistic, historical, social and cultural perspectives evolving over time in Japan and the Japanese-speaking communities; developing and demonstrating an understanding of ideas and current issues of global significance through a large variety of activities in related topics at the advanced Japanese language proficiency level

**ICIC 412 Advanced Japanese II - Language and Culture**

**4 (4-0-8)**

**Prerequisites:** ICIC 411 Advanced Japanese I – Language and Culture

Developing linguistic and cultural abilities to conduct communication exchanges in Japanese language at the advanced level in today's workplace; acquiring a range of soft skills to communicate effectively in professional environments; developing a knowledge of job markets, career paths and opportunities for Japanese language speakers

**ICIC 421 Advanced French I – Language and Culture**

**4 (4-0-8)**

**Prerequisites:** ICIC 323 Intermediate French III - Language and Culture

Analyzing and making use of linguistic, historical, social and cultural perspectives evolving over time in France and the French-speaking world; developing and demonstrating an understanding of ideas and current issues of global significance through a large variety of activities in related topics at the advanced French language proficiency level

**ICIC 422 Advanced French II - Language and Culture**

**4 (4-0-8)**

**Prerequisites:** ICIC 421 Advanced French I – Language and Culture

Developing linguistic and cultural abilities to conduct communication exchanges in French language at advanced level in today's workplace; acquiring a range of soft skills to communicate effectively in professional environments; developing a knowledge of job markets, career paths and opportunities for French language speakers

**ICIC 431 Advanced Chinese I – Language and Culture**

**4 (4-0-8)**

**Prerequisites:** ICIC 333 Intermediate Chinese III - Language and Culture

Analyzing and making use of linguistic, historical, social and cultural perspectives evolving over time in China and the Chinese-speaking world; developing and demonstrating an understanding of ideas and current issues of global significance through a large variety of activities in related topics at the advanced Chinese language proficiency level

**ICIC 432 Advanced Chinese II - Language and Culture**

**4 (4-0-8)**

**Prerequisites:** ICIC 431 Advanced Chinese I – Language and Culture

Developing linguistic and cultural abilities to conduct communication exchanges in Chinese language at the advanced level in today's workplace; acquiring a range of soft skills to communicate effectively in professional environments; developing a knowledge of job markets, career paths and opportunities for Chinese language speakers

**ICIC 441 Advanced Spanish I – Language and Culture**

**4 (4-0-8)**

**Prerequisites:** ICIC 343 Intermediate Spanish III - Language and Culture

Analyzing and making use of linguistic, historical, social and cultural perspectives evolving over time in Spain and the Spanish-speaking world; developing and demonstrating an understanding of ideas and current issues of global significance through a large variety of activities in related topics at the advanced Spanish language proficiency level

**ICIC 442 Advanced Spanish II - Language and Culture**

**4 (4-0-8)**

**Prerequisites:** ICIC 441 Advanced Spanish II - Language and Culture

Developing linguistic and cultural abilities to conduct communication exchanges in Spanish language at the advanced level in today's workplace; acquiring a range of soft skills to communicate effectively in professional environments; developing a knowledge of job markets, career paths and opportunities for Spanish language speakers

**ICIC 453 Research Seminar**

**4 (4-0-8)**

**Prerequisites:** ICIC 254 History of Ideas I OR PD approval

A rigorous review and application of academic rationales and research principles; providing step-by-step guidance for an efficient approach to research and academic writing; utilizing a hands-on method; requiring students to work independently on areas of their own interest which they will discuss and present to the entire seminar

**ICIR 101 Approaches to International Relations and Global Affairs**

**4 (4-0-8)**

**Prerequisites:** None

The principles and practice of international relations, with particular reference to the modern world; the bases of international power and interstate competition; inequalities among states, including domination and colonialism; war and conflict resolution among great powers; the role of trade, defense policies, and control over scarce resources; the involvement of non-state players, including international organizations and special interest groups; international issues concerning the treatment of minority groups, human rights, the use of the environment, international crime, and terrorism

**ICIR 102 Approaches to Comparative Politics and Systems**

**4 (4-0-8)**

**Prerequisites:** None

Various forms of political systems, both in theory, principle, and practice; political systems in stateless societies, traditional kingdoms and empires, absolutist states, democracies, and modern "authoritarian" and militaristic states; various forms of representation, the party-political systems, elections, and decision-

making; the working of the executive, legislative, and judicial aspects of government and their interrelationships

**ICIR 201 The Formation of the Modern World: From the Industrial Revolution to High Imperialism** **4 (4-0-8)**

**Prerequisites:** None

Selected aspects of world history from c.1763 to 1914; the Industrial Revolutions and the growth of the world economy; the American and French Revolutions; Latin American independence and development; political developments in Europe and the United States: representative government, the abolition of slavery, nationalism, socialism, women's rights; imperialism and responses to it; the emergence of Japan; wars and warfare; social, scientific, medical and technological development; primary sources analysis

**ICIR 202 Globalization and the International Order in the Twentieth Century: From the First World War to 9/11** **4 (4-0-8)**

**Prerequisites:** ICIR 201 The Formation of the Modern World: From the Industrial Revolution to High Imperialism

A short introduction to selected aspects of world history since World War I; the USA and the USSR as superpowers; the Cold War; the UN system; decolonialization and the 'Third World'; major regional powers; the Soviet collapse and its repercussions; regional conflicts in the Middle East, South Asia, and the Balkans; economic, technological and scientific developments; the great consumer boom; OPEC and oil prices; the World Bank and IMF; the EU and other economic regionalisms; world poverty; new political movements: Civil Rights, feminism, radical Islam; Ethnic conflicts and nationalism

**ICIR 203 Foundations of Political Thought** **4 (4-0-8)**

**Prerequisites:** None

A historical survey of the major paradigms in the social sciences (history, political science, economics, sociology, anthropology, geography, psychology) during the twentieth century; concepts and paradigms of political thought

**ICIR 204 Perspectives on International Relations** **4 (4-0-8)**

**Prerequisites:** None

Theories of international relations; sovereignty; globalization and change; security; realism; anarchism; liberalism; neoliberal institutionalism; Marxism; constructivism; post-structuralism; critical approaches to international relations

**ICIR 211 Globalization and Social Change****4 (4-0-8)****Prerequisites:** None

The global structures and transformations of the late twentieth century; the global economy, food supply, population, disease, environment, resources, and pollution; communications; geopolitics, national states, regional, and international organizations; minorities; the role of women; warfare and terrorism; migration and refugees, crime, culture; global structures and transformations in the world

**ICIR 212 Social Institutions of the Modern World****4 (4-0-8)****Prerequisites:** None

Basic social institutions in comparative global perspective; socialization, marriage and the family; education and knowledge; religion and culture; media and communication; government and administration; politics and power; multi-institutional politics approaches in sociology

**ICIR 213 Conflict, War and Peace Studies****4 (4-0-8)****Prerequisites:** None

The impact of war upon society and the state; social and political consequences of war; the mobilization of society in times of war; the status of human rights and freedom in times and places of war, politics and war; patterns of military organization, the possible social and political role of the military; major approaches to conflict, war and peace in comparative global perspectives

**ICIR 214 Perspectives on Thailand****4 (4-0-8)****Prerequisites:** None

Traditional Thai culture, social structure and hierarchy; interpersonal relations; kreng jai; family; the role of Buddhism and animism; folk traditions (birth, life, marriage, death, etc.); the modern period; the impact of Chinese, Western and Japanese culture; business culture; the rural-urban division; major approaches to perspectives on Thailand in international relations

**ICIR 215 Thai Foreign Policy****4 (4-0-8)****Prerequisites:** None

The influence of geopolitics on Thailand's foreign policy; pre-modern interstate relations and concepts in Southeast Asia and their continuing influence; Siam's relations with the Western imperial powers in the Colonial Period; the evolution of Thailand's foreign policy and relations during the First and Second World Wars; Thailand's foreign policy during the Cold War, especially its relations with the USA, the formulation

and effects of current Thai policies regarding ASEAN, the UN, APEC, and other regional and international organisations; the evolution and impacts of current Thai bilateral relations with China, the Koreas, Japan, and India; formulation, evolution, and results of Thai foreign policy from the mid-nineteenth century to the present day; with a particular focus on analysing the decision-making process in a selected case study

#### **ICIR 217 Culture and Power**

**4 (4-0-8)**

**Prerequisites:** None

Discussing, analyzing and comparing dimensions and categories of ‘power’; the dynamics of open and hidden forms of power at the global, state, national, community, and personal level; origins and limitations of coercive power in stateless societies; hierarchy and surveillance; domination and resistance; impacts of “culture and personality” to contrasting mindsets and modalities of political leadership; legal cultures and inscriptions of power; politics of cross-cultural dialogue; civilizationalism and cultural nationalization; local vs. global culture; and the troubled relationship between cultural relativism and universal Human Rights

#### **ICIR 218 Authoritarian Populism**

**4 (4-0-8)**

**Prerequisites:** None

Rapid rise of authoritarian populism and attendant forces; emergence of challenging new dynamics in established Western democracies and less established democracies across Asia and Latin America (e.g., United States, United Kingdom, Thailand, Venezuela, Turkey, the Philippines, Brazil); unstable political orders; reversal of democratization; exploration of contributing factors to authoritarian populist rise; implications of authoritarian populist expansion; strategies for resistance and reversal of authoritarian populist trends

#### **ICIR 219 Genders and Sexual Diversity in the Globalized World**

**4 (4-0-8)**

**Prerequisites:** None

Explaining the diversity of genders and sexualities in the globalized world; discussing the feminist approaches to international relations; feminist research in international relations; feminist theories; examining challenges and pressures among the marginalized gender groups; movements for LGBTQ rights; LGBTQ advocacy and international affairs; exploring genders and humanitarian crises; sexual and gender-based violence in wars and conflicts

#### **ICIR 221 International Political Economy**

**4 (4-0-8)**

**Prerequisites:** None

The historical development of a world political society and the structures of international diplomacy; war and peace-making between the Great Powers; The Concert of Europe; The League of Nations; the United Nations and the Cold War; International agreements, treaties, and organizations; the principles of international law and the international political economy; the historical development towards a peaceful world order

#### **ICIR 222 International Organizations**

**4 (4-0-8)**

**Prerequisites:** None

The development of international organizations since the 19th century; their nature, function, and purpose; contemporary global and regional international organizations (the United Nations, ILO, WTO, and the IMF; the EU, ASEAN, NAFTA, APEC, etc.); their effectiveness and future; international organizations from a comparative perspective

#### **ICIR 223 Democracy as a Political System**

**4 (4-0-8)**

**Prerequisites:** None

Historical developments; the principles, practices, and processes of democracy; essential elements; criticisms, strengths, and weaknesses; alternative systems; social and cultural prerequisites for democracy; possible future developments; the historical development, principles and practices of democracy

#### **ICIR 224 Security and Conflict in a Global Perspective**

**4 (4-0-8)**

**Prerequisites:** None

Recent developments of warfare with particular reference to the contemporary world; the development of armed forces and innovations in weaponry, tactics and strategy; social and economic costs of warfare; combat and combatants; provisioning and planning; the use of reporting and propaganda in support of warfare; the industrialization of war and the rise of “New Wars”; types of warfare and security challenges in the contemporary world

#### **ICIR 225 Global Media, Social Change and International Relations**

**4 (4-0-8)**

**Prerequisites:** None

The development of the media as a global socializing force; the creation of a global market place; the information age; the power of the media in society and politics; the new global media culture; global opinions and discursive politics in shaping debates and policies

#### **ICIR 226 The History and Concept of Diplomacy**

**4 (4-0-8)**

**Prerequisites:** None

The uses of diplomacy and negotiation in resolving political and commercial disputes; the role and status of diplomats and negotiators; the question of political versus commercial issues; state-to-state relations; business-to-state relations; international business-state relations; conflict generation and diplomatic model solutions; the conceptual foundations in understanding diplomacy

#### **ICIR 227 Approaches to Culture and Society**

**4 (4-0-8)**

**Prerequisites:** None

Culture in the modern world; the study of symbol; how culture is defined and created; modernity, post-modernity, and techno-culture; dominant and minority cultural forms; gender, sexuality and ethnicity; globalism and post-colonialism; the culture of everyday life; theoretical approaches to culture and society

#### **ICIR 228 Europe and the 'West' in the Contemporary World**

**4 (4-0-8)**

**Prerequisites:** None

The current situation in Europe; economic developments and trend; the growth and strength of the EU; the relations between Eastern and Western Europe; ethnicity, separatism, and conflict in Western Europe and the Balkans; Cyprus and the relationship between Greece and Turkey; immigration; Brexit

#### **ICIR 229 Environment and Natural Resources in Global Affairs**

**4 (4-0-8)**

**Prerequisites:** None

The availability, distribution and uses of the world's resources: food, water, land, soil, minerals, energy, fisheries, etc; resource depletion and optimal usage; public policies, international agreements and business needs as related to the production, distribution and exchange of resources; relevant technological and scientific developments; future prospects; the environment and its impact on international relations

#### **ICIR 237 International Economic Relations**

**4 (4-0-8)**

**Prerequisites:** None

Examining the International economic relations before and after World War II; Globalization and the evolution of International economic relations; monetary arrangements and how the money market works; international trade policies; international movement of factor of production: capital and labor; transnational corporations; international economic integrations; international financial institutions

#### **ICIR 238 Politics and Identity in Cold War Europe, 1945-1991**

**4 (4-0-8)**

**Prerequisites:** None

A political and economic history of Europe since 1945; the devastation of World War II; Marshall Aid and economic recovery; the impact of the Cold War; the early development of the European Economic Community; the foreign policies of Britain, France, and Germany; the loss of empire. Internal political, social and economic developments in the major European countries; immigration; the situation in Eastern Europe; the collapse of communism and its consequences; the European Union; the contemporary situation and future prospects

**ICIR 239 Nations and Nationalisms**

**4 (4-0-8)**

**Prerequisites:** None

Introducing the concepts of nation, race and identity; language, religion, race and culture; theories of ethnicity, identity, politics and ethno-genesis; processes of nation-building in selected countries; theories on different types of nationalisms; the emergence of minorities and majorities within states; processes of displacement, migrations and diasporas; the impact of this mobility on the resilience of the state and the economy; political and cultural aspects of ethno-religious and ethno-linguistic nationalisms; selected secessionist, separatist or federalist nationalist movement

**ICIR 241 International Relations of South Asia: From Imperialism to the Modern World** 4 (4-0-8)

**Prerequisites:** None

The conflict and cooperation between two nuclear states (India and Pakistan); inter-country relations, power interventions; political, military, and economic conflict and cooperation. Religions, diversity, and conflicts; the rise of European influence; the British raj; social and economic transformations; movements of religious reform and protest; the independence movement; economic and political developments since 1947; understanding, analyzing and assessing the importance of the Indian Sub-Continent

**ICIR 242 Geopolitics and Geoeconomics**

**4 (4-0-8)**

**Prerequisites:** None

How political clout at the international level is distributed, accumulated and diminished in accordance with indicators of powers; military strength; population; human capital; natural resources; investment; industries; manufacturing; finance. International influence as measured and changes due to international and national factors; geopolitical and geo-economic trends

**ICIR 243 US Foreign Policy: 1945-Present**

**4 (4-0-8)**

**Prerequisites:** None

US foreign policy, international affairs (20th-21st century), post-WWII national security state, Cold War rivalry, Western alliance leadership, Communist bloc, decolonization (Global South), Cold War US power projection, post-bi-polarity, isolationism, interventionism, US-Soviet relations, post-Cold War, War on Terror, US-China relations

#### **ICIR 244 Sustainable Development: Politics and Practice**

**4 (4-0-8)**

**Prerequisites:** None

Politics and concept of sustainability; United Nations' SDGs; green growth vs. degrowth, doughnut economics, sustainability and the risk society; tensions between global sustainable development agendas and national politics; "smart" technologies and the sustainability discourse; digital inequalities and approaches to closing the digital divides; nudging and disciplinary power within sustainable development practices; local and indigenous empowerment, digital social movements and their contribution to sustainable development

#### **ICIR 302 ASEAN and Southeast Asian Regionalism**

**4 (4-0-8)**

**Prerequisites:** None

Southeast Asia in the context of global politics in the period since World War II; the impact of the Cold War and its ending; the international relations of the Southeast Asian states; ASEAN regionalism

#### **ICIR 303 Transnational Movements and Migration**

**4 (4-0-8)**

**Prerequisites:** None

The development of organized labour following the Industrial Revolution; social changes induced by industrialism; factory conditions and reform; early labour movement; consolidation of trade unionism in Britain; labour and union movements in Continental Europe; labour movements in the USA and the British Dominions up to World War I and II; labour movements worldwide from 1914 to the present day; issues of the trade union organization, power and influence in the modern world and migration; impacts and responses of international organizations and states

#### **ICIR 304 Transnational Crime**

**4 (4-0-8)**

**Prerequisites:** None

The scope of transnational crime; international agencies and institutions involved in interdiction efforts; interdiction procedures and jurisdictions; controlling smuggling and piracy; investigation of international financial crimes such as fraud, tax evasion and money laundering; human trafficking networks; the

international drug trade; intellectual property rights regimes and violations; cybercrime; terrorism; crimes against humanity; effects of transnational criminal networks; responses by state and non-state actors

#### **ICIR 305 Conflict Resolution**

**4 (4-0-8)**

**Prerequisites:** None

Origins and methods of conflict resolution; typologies and historical trends of conflict and violence; conflict prevention and containment; negotiation and international agreements; cessation of hostilities and durable standards for the implementation of conflict settlements; terrorism, justice, and the rule of law; modern warfare dynamics and ways to counter internecine conflict cycles

#### **ICIR 306 Intelligence, Data and Surveillance**

**4 (4-0-8)**

**Prerequisites:** None

Intelligence gathering and whistleblowers; cyberwarfare; artificial intelligence and international competition; autonomous weapons and the future of war; surveillance and privacy; surveillance states; surveillance capitalism; surveillance technology and biometrics; surveillance and everyday life

#### **ICIR 307 The United Nations and Contemporary World Politics**

**4 (4-0-8)**

**Prerequisites:** None

Exploring the birth of the United Nations and its historical circumstances from its beginning since 1945; the impact of the Second World War and international Order; lessons learned from the League of Nations; key UN functions; the organization structure; main bodies and agencies; roles of UN Security Council and the status of the five permanent members; General Secretary; Economic and Social Council; International Court of Justice; Peace Keeping Forces; roles of specialized agencies; challenges the UN faces in the contemporary world politics; strengths and weaknesses of the UN's role

#### **ICIR 308 Political Islam**

**4 (4-0-8)**

**Prerequisites:** None

Discussing, analyzing and evaluating the foundations and history of political Islam; the rise of Islamic fundamentalism in the contemporary world; Islam and the West; Islam in SEA; Islamic modernity; Islamic law and politics; Islamic economics; Islamism and fundamentalism; religious transnationalism; Islamic geostrategies; Islamic globalism, jihadist internationalism and 'the caliphate'

#### **ICIR 309 Public Diplomacy and Nation Branding**

**4 (4-0-8)**

**Prerequisites:** None

Public Diplomacy a cross-section of international communication and diplomacy; a new paradigm of international relations; practice of diplomacy; unlike traditional diplomacy; multifaceted international communications by individual citizens; NGO's; governmental agents; agencies. Public Diplomacy focuses on the strategies, techniques, practices; influencing public attitudes and opinions; Nation and/or State Branding as an emerging field which is multidisciplinary in nature; modern management; marketing; public administration; to differentiate themselves and compete in a globalized world and marketplace

#### **ICIR 311 Foreign Policy Analysis**

**4 (4-0-8)**

**Prerequisites:** None

The foreign policy of the United States; the Soviet Union; Russia and China other powers since 1945; objectives and realities; relations between these powers; the foreign policy role played by the Western European powers, Japan and India; comparative foreign policies

#### **ICIR 312 International Law and International Relations**

**4 (4-0-8)**

**Prerequisites:** None

The nature, development, and current status of international law; the legal personality of states and other entities under the international law; recognition; territory; jurisdiction and immunity; treaties; state responsibilities; the settlement of disputes and the use of force; laws of the sea, air and space; environmental law; human rights; international legal institutions; enforcement of international law; key concepts of international law in an international relations context

#### **ICIR 313 Human Rights and International Relations**

**4 (4-0-8)**

**Prerequisites:** None

The concept of human rights in philosophical, historical, and legal perspective; human rights in contemporary international law; international conventions and the United Nations; individual rights; war crimes; the protection of minorities; economic, and cultural rights; human rights from an interdisciplinary perspective

#### **ICIR 314 International Development Studies**

**4 (4-0-8)**

**Prerequisites:** None

Concepts of political and economic development; policies, structures and patterns of change; production and investment priorities; the consequences of economic transformation in poor countries; contrasting results in Asia, Africa, and Latin America; urbanization and urban-rural relations; social and economic

stratification; problems and challenges relating to commerce, travel and the communication revolutions; international development and its impacts

#### **ICIR 321 Political Risk, Business and International Relations**

**4 (4-0-8)**

**Prerequisites:** None

How political power, interests, values, local culture, systems, technology create risks for international business; political risk in developed countries; implications for non-western companies overseas; how to anticipate, manage and mitigate political risks

#### **ICIR 322 The Politics and Economics of Non-Governmental Organizations**

**4 (4-0-8)**

**Prerequisites:** None

The history and development of Non-Governmental Organizations at the national and international levels, the identification of social issues: slavery, women's and minority rights, civilians and the injured in wartime, refugees, civil rights, environmental issues, global political and economic movements; the relation of NGOs with the state and international organizations; the politics, organization and finance of NGOs; NGOs in relationship with business

#### **ICIR 323 The Practice of Diplomacy**

**4 (4-0-8)**

**Prerequisites:** None

The uses of diplomacy; negotiation; conflict resolution; political and commercial disputes; describing the role; function; methods of diplomats and negotiators in international relationships; methods to identify problems and develop innovative solutions

#### **ICIR 324 Society and Technology in the Modern World**

**4 (4-0-8)**

**Prerequisites:** None

The social impact of science and technology up to c. 1900; the early 20th century: transportation, the technology of warfare, the 'New Physics' of Einstein and Bohr; developments since World War II; computers; satellite communications; the Internet; genetic engineering; and medical advances; impacts of new media in international affairs

#### **ICIR 325 Migration, Diasporas and the Politics of Space**

**4 (4-0-8)**

**Prerequisites:** None

Reasons; contexts of migration historically; preservation; transformations of traditional cultures and identities in alien land; enclave communities and host societies; generational differences in culture amongst migrants; the image of homeland; the cultural impact of the movement of peoples

### **ICIR 327 Ethnicity and Representation in International Affairs**

**4 (4-0-8)**

**Prerequisites:** None

The concept of ethnicity; ethnic labeling and identity; the concept of race; minority groups, wider society, and the state; acceptance, prejudice and discrimination; economic, political, and sociocultural aspects of ethnicity; ethnic conflicts; ethnic cleansing and genocide; the relationship of ethnicity and the state in international affairs

### **ICIR 328 Citizenship and Transnationalism**

**4 (4-0-8)**

**Prerequisites:** None

Examination of the changing conception of citizenship in the context of transnational capitalism and corporate power; neoliberalism and the depoliticisation of civic life; consumer citizenship; transnational corporations as development and political actors; corporations and intergovernmental international organisations; national and transnational identities; Zygmunt Bauman's liquid identities; state sovereignty in the context of transnationalism; transnational social movements; resistance and anti-transnational social movements

### **ICIR 331 Religion and Politics in the Contemporary World**

**4 (4-0-8)**

**Prerequisites:** None

Religion and society; types of religious organizations and movements and their social role and impact; secularization and counter-secularization; religion; politics; and the state; case studies on the contemporary role of religion in selected societies

### **ICIR 332 Comparative Regionalism**

**4 (4-0-8)**

**Prerequisites:** None

Theoretical viewpoints on regionalism; major regional organizations; foundations, purposes, functions and institutional designs; methods of interaction in a global perspective

### **ICIR 334 Terrorism, Counterterrorism and Political Violence**

**4 (4-0-8)**

**Prerequisites:** None

A brief historical survey of terrorism; theories of terrorism; a critical examination of political theory regarding the rights and wrongs of revolt and terrorism; the relationship of the modern state with terrorism and societies; terrorism in the contemporary world

**ICMA 214 Ordinary Differential Equations****4 (4-0-8)****Prerequisites:** ICMA 213 Calculus II

First-order differential equations, linear differential equations of higher order, series solutions, systems of linear differential equations, applications to physics, engineering, and other fields

**ICMA 240 Linear Algebra I****4 (4-0-8)****Prerequisites:** Placement test **OR** ICMA 101 Precalculus

Systems of linear equations, matrix algebra, determinants, vector spaces, linear transformations, eigenvalues and eigenvectors, diagonalization, applications

**ICMA 241 Linear Algebra II****4 (4-0-8)****Prerequisites:** ICMA 240 Linear Algebra I

Inner product spaces, symmetric matrices and quadratic forms, numerical methods, singular value decomposition, applications

**ICMA 253 Statistics for Science II****4 (4-0-8)****Prerequisites:** ICMA 151 Statistics for Science I

Two-sample problems, analysis of variance (ANOVA), chi-squared tests, correlation matrix, regression analysis, nonparametric methods

**ICMA 313 Number Theory and Cryptography****4 (4-0-8)****Prerequisites:** ICMA 120 Mathematical Foundations and Proof Techniques

Divisibility; prime numbers; congruences; Chinese remainder theorem; quadratic reciprocity; Diophantine equations; arithmetic functions; public-key cryptography; RSA algorithm; elliptic curve cryptography; digital signatures; applications in computer security

**ICMA 316 Graph Theory****4 (4-0-8)****Prerequisites:** ICMA 242 Discrete Mathematics **OR** ICCS 206 Discrete Mathematics

Fundamental concepts of graphs; adjacency and incidence; paths, cycles, and subgraphs; trees and forests; matching and covering problems; vertex and edge connectivity; graph traversals; planar graphs and duality; graph coloring: vertex coloring, edge coloring, and chromatic polynomials; introduction to random graphs; applications in computer science and network analysis

**ICMA 319 Combinatorics****4 (4-0-8)**

**Prerequisites:** ICMA 242 Discrete Mathematics **OR** ICCS 206 Discrete Mathematics

Basic counting principles; permutations and combinations; binomial coefficients; inclusion-exclusion principle; generating functions; recurrence relations; Ramsey theory; design theory; extremal set theory; probabilistic methods in combinatorics; applications in computer science and statistics

### **ICMA 321 Game Theory**

**4 (4-0-8)**

**Prerequisites:** ICMA 240 Linear Algebra I

Strategic decision-making, two-person zero-sum games, mixed strategies, Nash equilibrium, nonzero-sum games, cooperative games, bargaining, repeated games, evolutionary game theory, applications to economics, politics, and biology

### **ICMA 322 Advanced Calculus**

**4 (4-0-8)**

**Prerequisites:** ICMA 120 Mathematical Foundations and Proof Techniques

The real number system, sequences of real numbers, limits and continuity of functions, differentiation, Riemann integration

### **ICMA 323 Partial Differential Equations**

**4 (4-0-8)**

**Prerequisites:** ICMA 218 Multivariable Calculus, ICMA 214 Ordinary Differential Equations

First-order PDEs; classification of second-order PDEs; separation of variables; Fourier series and transforms; heat equation; wave equation; Laplace equation; method of characteristics; Green's functions

### **ICMA 335 Complex Variables**

**4 (4-0-8)**

**Prerequisites:** ICMA 213 Calculus II, ICMA 218 Multivariable Calculus

Complex numbers; analytic functions; Cauchy-Riemann equations; elementary functions; complex integration; Cauchy's theorem; Cauchy's integral formula; Taylor and Laurent series; residues; applications

### **ICMA 344 Time Series Analysis**

**4 (4-0-8)**

**Prerequisites:** ICMA 151 Statistics for Science I

Basic principles of representing time series in both the time and frequency domains; Box and Jenkins technique of fitting data to autoregressive moving average models in the time domain; model construction; evaluation and forecasting; analysis of time domain and digital filtering; methods of estimating and interpreting the spectrum

### **ICMA 346 Optimization**

**4 (4-0-8)**

**Prerequisites:** ICMA 240 Linear Algebra I

Linear programming; simplex method; duality theory; sensitivity analysis; integer programming; dynamic programming; applications in economics, engineering, and data science

**ICMA 350 Probability**

**4 (4-0-8)**

**Prerequisites:** ICMA 213 Calculus II

Sample spaces; basic axioms of probability; conditional probability and independence, random variables, expectation and moment-generating functions, discrete and continuous distributions, central limit theorem

**ICMA 353 Actuarial Mathematics I**

**4 (4-0-8)**

**Prerequisites:** ICMA 106 Calculus I

Time value of money; annuities; loans; bonds; general cash flows; portfolios; asset liability management; reserving; valuation; pricing; asset/liability management; investment income; capital budgeting; valuing contingent cash flows

**ICMA 354 Actuarial Mathematics II**

**4 (4-0-8)**

**Prerequisites:** ICMA 151 Statistics for Science I, ICMA 350 Probability

Stochastic processes; survival models; probability distributions; statistical estimation; insurance claim modeling; generalized linear models (GLMs); model diagnostics

**ICMA 356 Decision Analysis**

**4 (4-0-8)**

**Prerequisites:** ICMA 151 Statistics for Science I OR ICMA 152 Business Statistics

Decision models; expected monetary values; decision flow diagrams; probability assessment; optimization techniques; perfect information; opportunity losses; uncertain payoffs; biased measurements; utility theory; judgmental probability; normal form of analysis; economics of sampling; risk sharing

**ICMA 393 Special Topics in Applied Mathematics I**

**4 (4-0-8)**

**Prerequisites:** Permission of instructor

Topics of current interest in statistics

**ICMA 395 Special Topics in Applied Mathematics II**

**4 (4-0-8)**

**Prerequisites:** Permission of instructor

Topics of current interest in optimization

**ICMA 410 Stochastic Processes****4 (4-0-8)****Prerequisites:** ICMA 151 Statistics for Science I, ICMA 240 Linear Algebra I

Introductory stochastic processes; expectation; conditional expectation and variance; discrete Markov chains; transition probabilities; Chapman-Kolmogorov equations; stationary distributions; exponential distribution and the Poisson process; continuous-time Markov chains

**ICMA 412 Heuristic Optimization****4 (4-0-8)****Prerequisites:** ICMA 151 Statistics for Science I

Basic difficulties in problem solving; need for heuristic optimization; basic concepts: representation, optima, neighborhood; exhaustive search and local search methods; greedy algorithms; simulated annealing; tabu search; genetic algorithms; evolutionary algorithms; particle swarm optimization; ant colony optimization; multi-objective optimization; constraint handling techniques; applications in scheduling, routing, and design problems

**ICMA 424 Abstract Algebra****4 (4-0-8)****Prerequisites:** ICMA 120 Mathematical Foundations and Proof Techniques

Groups; subgroups; cyclic groups; permutation groups; cosets; normal subgroups; quotient groups; group homomorphisms; rings; integral domains; ideals; quotient rings; ring homomorphisms; polynomial rings; fields

**ICMA 425 Differential Geometry****4 (4-0-8)****Prerequisites:** ICMA 218 Multivariable Calculus, ICMA 240 Linear Algebra I

Curves in Euclidean space; Frenet frames; curvature and torsion; surfaces in Euclidean space; first and second fundamental forms; principal curvatures; Gaussian and mean curvatures; geodesics; Gauss-Bonnet theorem; introduction to Riemannian geometry

**ICMA 432 Multivariate Analysis****4 (4-0-8)****Prerequisites:** ICMA 151 Statistics for Science I

Multivariate normal distribution; multiple and partial correlation; Wishart distribution; Hotelling's T distribution; multivariate analysis of variance; discriminant analysis; factor analysis

**ICMA 435 Regression Analysis****4 (4-0-8)****Prerequisites:** ICMA 151 Statistics for Science I

Simple and multiple regression, diagnostics, model selection, models with categorical variables

**ICMA 450 Mathematical Modeling** 4 (4-0-8)

**Prerequisites:** ICMA 213 Calculus II

Construction and analysis of mathematical models; deterministic and stochastic models; difference equations; differential equations; dynamical systems; optimization models; probabilistic models; simulation; applications in biology, physics, economics, and engineering

**ICMA 452 Mathematical Finance and Derivatives** 4 (4-0-8)

**Prerequisites:** ICMA 350 Probability

Financial derivatives; options pricing; binomial model; Black-Scholes model; introduction to stochastic calculus; applications of Itô's lemma; portfolio optimization; risk management

**ICMA 484 Special Topics in Applied Mathematics III** 4 (4-0-8)

**Prerequisites:** Permission of instructor

Topics of current interest in mathematical analysis

**ICMA 485 Special Topics in Applied Mathematics IV** 4 (4-0-8)

**Prerequisites:** Permission of instructor

Topics of current interest in algebra and number theory

**ICMA 486 Special Topics in Applied Mathematics V** 4 (4-0-8)

**Prerequisites:** Permission of instructor

Topics of current interest in geometry

**ICMA 487 Special Topics in Applied Mathematics VI** 4 (4-0-8)

**Prerequisites:** Permission of instructor

Topics of current interest in combinatorics

**ICMB 150 Introduction to Programming and Business Applications** 2 (2-0-4)

**Prerequisites:** None

Introductory course to programming concepts and processes in incorporating related technologies from various platforms to build business applications; mechanisms in computer programming, such as variables, objects, operators, flow control, loops, functions, and data processing; using application programming

interfaces (API); business applications that integrate with various platforms for information collection, information sharing, and information processing for businesses

#### **ICMB 152 Business Statistics**

**4 (4-0-8)**

**Prerequisites:** ICMB 151 Business Mathematics

Introduction to theories and applications of statistics in business using computer software. Descriptive statistical measures of discrete and continuous probability distributions. Inferential statistical analyses through sampling distributions, point and interval estimations, and hypothesis testing. Basic of analysis of variance and linear regression

#### **ICMB 253 Microeconomics**

**4 (4-0-8)**

**Prerequisites:** ICMB 151 Business Mathematics

An introduction to microeconomics principles; economic scarcity; opportunity cost; demand and supply; elasticity; consumer surplus; producer surplus; consumer behavior; producer behavior; production costs; pricing theory; market structure

#### **ICMB 254 Macroeconomics**

**4 (4-0-8)**

**Prerequisites:** ICMB 151 Business Mathematics

Data of macroeconomics; the Gross Domestic Product (GDP); the Consumer Price Index (CPI), multiplier; unemployment; inflation; money market, interest rate; fiscal and monetary policies; IS-LM Model; AS-AD Model; international trade, exchange rate

#### **ICMB 255 Management of Business Information**

**4 (4-0-8)**

**Prerequisites:** None

Management of business data and models, connecting, cleaning, and preparing data. Building data models, financial models, scenario manager, goal seek, data tables and data analysis expressions (DAX). Analyzing data using pivot tables, power pivot, calculated columns and calculated measures. Visualization of data using sparklines, slicers, visualizations, dashboards and storyboards

#### **ICMB 256 Principles of Financial Accounting**

**4 (4-0-8)**

**Prerequisites:** None

An introductory accounting course to understand the impact of business transactions on organizations; Knowledge of basic accounting principles and techniques; The ability to use and provide the variety of

information to stakeholder including developing, presenting, understanding financial accounting information, analyzing results and making decisions

#### **ICMB 257 Business Finance for Entrepreneurs**

**4 (4-0-8)**

**Prerequisites:** ICMB 256 Principles of Financial Accounting

An overview of the principles and practices of business finance including time value of money, the valuation of financial assets, capital budgeting techniques, risk and return calculations, methodologies for determining the cost of capital, an estimation and forecasting of cash flows, and the project evaluation

#### **ICMB 258 Business Communication**

**4 (4-0-8)**

**Prerequisites:** None

Introduction to Business Communication; Principles of Effective Communication; Application of Communication Principles in Business Analysis; Written Communication in Formal and Informal Settings; Oral Communication Skills; Understanding Communication Processes in Business; Practical Business Writing Assignments; Business Presentation Skills; Professional Development Topics: Career Planning, Networking, Job Searching; Resume Preparation Techniques; Job Application Strategies; Interviewing Techniques

#### **ICMB 259 Principles of Marketing**

**4 (4-0-8)**

**Prerequisites:** None

Marketing concepts, the role of marketing in organization, creating-communicating-delivering-exchanging product and services that having value to customers and the society; customer needs and wants, consumer decision making process, marketing information and research, market segmentation-targeting-positioning, product development and life cycle management; pricing, channel management, marketing communication, customer relationship management

#### **ICMB 260 Management and Organizational Behavior**

**4 (4-0-8)**

**Prerequisites:** None

A study on the role of manager in an organization, emphasis on the understanding of behavioral and administrative theories and concepts needed to succeed in the modern organization. Topics includes organization structure, organizational changes, motivations, leadership, managing work and team, effective communication, principal conflict resolution management and environment, social and governance (ESG) for business sustainability growth

#### **ICMB 261 Human Resources Management**

**4 (4-0-8)**

**Prerequisites:** None

Disruptive change in work and employment; managing human resources strategically; ethical and social responsibility of HRM; people analytics and HR metrics; strategic workforce planning; job and workplace design; recruiting and selecting talents; assessing and improving employee performance; training and employee development; compensating human resources; enhancing employee relations; separating and retaining employees

#### **ICMB 262 International Business Management**

**4 (4-0-8)**

**Prerequisites:** ICMB 260 Management and Organizational Behavior

An examination of national differences in political, economic and legal systems, culture differences, global trade and economic growth, the impact of regional trading blocs, foreign exchange market, international business strategies and entry modes, marketing strategy, and corporate global competitiveness

#### **ICMB 350 Business Law**

**4 (4-0-8)**

**Prerequisites:** None

Introduction to Laws; Distinction between Law, Morality and Religion in different jurisdictions; Digital Laws; Contract Law; Company and Partnership Laws; Agency Laws and Employment Laws; Intellectual Property Laws; Resources and IT tools; Case studies to be applied in the business context for sustainable practices

#### **ICMB 351 Business Ethics and Sustainability**

**4 (4-0-8)**

**Prerequisites:** ICMB 260 Management and Organizational Behavior, ICMB 350 Business Law

An understanding, analysis of ethical concepts, and the implications of ethics in business decisions under different social and other business-related environments, an application of ethical principles to ethical issues within the organization and the external environment

#### **ICMB 352 Management Science**

**4 (4-0-8)**

**Prerequisites:** ICMB 151 Business Statistics, ICMB 255 Management of Business Information

An application of quantitative analysis techniques, linear programming, network models, decision analysis, business simulation

#### **ICMB 353 Operations Management**

**4 (4-0-8)**

**Prerequisites:** ICMB 151 Business Statistics, ICMB 255 Management of Business Information

Modern concepts, models and tools for planning, organizing, staffing, leading and controlling the production, distributing of goods and services

### **ICMB 371 Consumer Insights – A Qualitative Approach**

**4 (4-0-8)**

**Prerequisites:** ICMB 259 Principles of Marketing

Importance of consumer insights; psychological aspects of consumer behavior; the role of qualitative approach in discovering insights; qualitative research procedures; qualitative data collection methods, focus group discussion, in-depth interview, observation, projective techniques; data collection and fieldwork; data coding; qualitative data analysis methods; interpreting insights; turning insights into marketing ideas

### **ICMB 450 Strategic Managements**

**4 (4-0-8)**

**Prerequisites:** completed at least 124 credits

A study of strategic management; fundamental element of the organizational management strategy; process and frameworks of strategic management; an examination of both internal and external environment; competitive advantage; an identification of organization's mission, objective, policies and business strategy; foundation of a strategic analysis including the industry and company analysis; strategy formulation and implementation

### **ICMC 102 Man and Arts for Media and Communication**

**4 (4-0-8)**

**Prerequisites:** None

Studying the dynamic relationship of man, arts and society with focusing on the function of communication; theories on aesthetics being used to analyze various kinds of the media, such as visual arts, performing arts and music, to interpret the content, subject matter and value of the works of arts

### **ICMC 108 Visual Culture and Sociology**

**4 (4-0-8)**

**Prerequisites:** None

An investigation of historical and contemporary forms of visual communication: from painting, architecture, graffiti, photography, graphic design or video to contemporary consumer life, popular culture, subculture, mass media, commercial communication and advertising; examining the critical philosophies shaping visual communication, and various frameworks for the interpretation and evaluation of visual images they constantly consume

### **ICMC 112 Media and Culture in the Digital Age**

**4 (4-0-8)**

**Prerequisites:** None

Developing clear and engaging content about media-culture interactions in digital age; introducing media convergence strategies and their societal impact; examining contemporary digital media trends; practicing

initial analysis of media convergence implementations; creating content reflecting cultural identities and meanings; exploring audience engagement in converged media environments

### **ICMC 113 Introduction to Communication and Collaboration**

**4 (4-0-8)**

**Prerequisites:** None

Introducing foundational concepts of effective collaboration in media contexts; exploring and practicing techniques for team communication; identifying and leveraging individual strengths in media project teams; recognizing and adapting to changes in media environments; applying basic collaborative skills to media-related tasks; examining and developing strategies for personal growth in evolving media landscapes; implementing introductory teamwork principles in simple media projects

### **ICMC 208 Transmedia Storytelling**

**4 (4-0-8)**

**Prerequisite:** ICMC 102 Man and Arts for Media and Communication

Participating in a storytelling experience to design, create and share stories across multiple media platforms for entertainment, informational or social development purposes; writing and creating stories in various forms of media products accessible through multiple media entry points; creating the brand of media product creators through the storytelling

### **ICMC 209 Creativity and Digital Communication**

**4 (4-0-8)**

**Prerequisites:** ICMC 113 Introduction to Communication and Collaboration

Exploring the links and boundaries of creativity and digital communication and their usages; understanding how the digital world has changed the way we communicate and how creativity can maximize the effectiveness of digital communications; examining the digital communication in the near and mid future

### **ICMC 210 Basic Acting**

**4 (2-4-6)**

**Prerequisites:** None

Practice-based learning on becoming a complete human being, accepting the truth of self and truthfulness to the soul; understanding acting as a presentation of 'truth' through the development of the body relaxation and control, vocal training, trust and sensory awareness, improvisation and imagination; practicing the script interpretation, character development and acting approaches for performers; realistic acting scripts used for final acting presentation

### **ICMC 217 Media Psychology**

**4 (4-0-8)**

**Prerequisites:** None

The multidisciplinary course drawing from sensory narrative and cognitive psychology, motivation and learning theories, neuroscience, and advertising and marketing; analyzing the psychological impact of the media content and presentation (traditional sources of sight and sound, new interactive, digital media); including understanding human behavior through working with the media application, the impact of the media on individuals and society, and its use for social and political purposes

#### **ICMC 238 Foundations of Organizational Communication**

**4 (4-0-8)**

**Prerequisites:** None

Delving into communication's centrality in organizational functioning, culture; exploring communication practices within organizations; investigating influence on culture, leadership success, change management, team collaboration; studying theories, models, practical approaches; understanding how effective communication enhances efficiency, shapes culture, drives change

#### **ICMC 239 Pitching and Presenting for Success**

**4 (4-0-8)**

**Prerequisites:** None

Reducing nervousness, improving delivery; analyzing audience needs; selecting optimal presentation approaches; employing templates for swift setup; organizing persuasive, informational content; enhancing voice, body language; optimizing visual aid use; focusing on audience-centric benefits; efficiently planning, preparing, organizing, delivering briefings; constructing, presenting detailed briefings; addressing audience queries

#### **ICMC 240 Storytelling for Content Creation**

**4 (4-0-8)**

**Prerequisites:** None

Recalling fundamental techniques for effective storytelling across media platforms; identifying theoretical frameworks for content creation and audience engagement; recognizing methods for narrative development and multimedia integration; listing strategies for crafting compelling content for diverse platforms and audiences; naming data analytics tools to enhance communication strategies; recognizing industry standards for media content creation; stating goals for enhancing media knowledge and skills

#### **ICMC 243 Persuasion and Negotiation**

**4 (4-0-8)**

**Prerequisites:** None

Understanding modern communication processes and developing skills in persuasion and negotiation while designing and evaluating persuasive messages and content by applying theories and research to influence

beliefs attitudes and behaviors through exploring value-based negotiation strategies and analyzing motivation in micro meso and macro contexts with an emphasis on ethical persuasion and negotiation

#### **ICMC 308 Theatre Production I**

**4 (2-4-6)**

**Prerequisites:** None

Introducing fundamental stagecraft, technical production principles; combining theoretical study, hands-on experience; exploring set design, lighting, sound, costume, prop construction; emphasizing skill development, technique mastery for successful production execution, from concept to performance

#### **ICMC 309 Theatre Management I**

**4 (2-4-6)**

**Prerequisites:** None

Exploring principles, practices of managing theatrical productions, venues; combining theoretical study, hands-on experience; covering production planning, budgeting, marketing, box office management, front-of-house operations; emphasizing skills, knowledge development for overseeing logistical, administrative aspects of successful theatre production

#### **ICMC 310 Theatre Production II**

**4 (2-4-6)**

**Prerequisites:** None

Advancing intricacies of stagecraft, technical production; honing skills in set, lighting, sound, costume design, prop construction through advanced practical projects, real-world production opportunities; emphasizing technical expertise refinement, problem-solving, collaboration in creative teams to realize theatrical visions on stage;

#### **ICMF 331 Financial Management**

**4 (4-0-8)**

**Prerequisites:** ICMB 257 Business Finance for Entrepreneurs

Goals of financial management; financial markets and yields; the concept of corporate governance in financial management; corporate valuation models; methods in financial statement analysis; working capital management; long-term financial planning and forecasting; capital structure theories and implications; distributions to shareholders

#### **ICMF 332 Financial Markets**

**4 (4-0-8)**

**Prerequisites:** ICMB 257 Business Finance for Entrepreneurs

A study of financial markets focusing on international financial systems, market-institution links, financial instrument dynamics, and regulatory frameworks; Fundamental knowledge of financial instruments

including bonds, equities, foreign exchanges, commodities, derivatives, and cryptocurrencies; The role of interest rate in the global monetary system; Financial institutions and central bank structures; Application of financial formulas or models to quantitatively and qualitatively evaluate financial markets and instruments

#### **ICMF 333 Investment Analysis and Portfolio Management**

**4 (4-0-8)**

**Prerequisites:** ICMF 331 Financial Management **AND** ICMF 332 Financial Markets

An overview of investment-related concepts, including types of asset classes, asset allocation, and risk and return analysis; portfolio construction techniques; theories and practical application of mutual funds and exchange-traded funds (ETFs) in investment portfolios; investment strategies

#### **ICMF 334 Risk Management and Derivatives**

**4 (4-0-8)**

**Prerequisites:** ICMF 331 Financial Management **AND** ICMF 332 Financial Markets

An introduction to risk management process under COSO framework; fundamental knowledge of derivative instruments including futures, options, and forward; quantitatively and qualitatively analyzing risks for the corporate; controlling risks with appropriate hedging techniques

#### **ICMF 346 Machine Learning in Finance**

**4 (4-0-8)**

**Prerequisites:** ICMB 150 Introduction to Programming and Business Applications **AND** ICMF 331 Financial Management

A finance course focusing on the intersection of machine learning (ML) and finance; an application of ML techniques to solve complex financial problems; fundamentals of machine learning, including supervised and unsupervised learning methods, neural networks, and deep learning, a utilization of machine learning concepts in various financial contexts such as algorithmic trading, credit scoring, fraud detection, and portfolio management; a combination of lectures, case studies, and hands-on machine learning project

#### **ICMF 347 Sustainable Finance and Investment**

**4 (4-0-8)**

**Prerequisites:** ICMB 257 Business Finance for Entrepreneurs

Concepts in corporate sustainability; regulatory landscape on corporate sustainability; role of capital market in related to sustainability; sustainability data and standards for disclosures and performance assessment; value chain and stakeholder analysis; sustainable-linked finance; integrating sustainability information in corporate valuation; sustainability trends in capital markets

#### **ICMF 431 Financial Analysis and Modeling**

**4 (4-0-8)**

**Prerequisites:** ICMF 331 Financial Management **AND** 4th Year Status

The capstone course for students majoring or minoring in finance; construction of financial models for financial and investment decision making; financial statement analysis, corporate and equity valuation, risk modeling, scenario analysis and financial simulation using spreadsheet-based financial models; financial case analysis and problem solving

#### **ICMI 350 Global Logistics and Supply Chain Management**

**4 (4-0-8)**

**Prerequisites:** ICMB 262 International Business Management

International Logistics Management; upstream and downstream business activities; procurement; demand forecasting; operations & production; warehouse and distribution center; logistics network design; supply chain technologies; transportation mode; inventory management

#### **ICMI 351 Global Trade, Policies, and Regulations**

**4 (4-0-8)**

**Prerequisites:** ICMB 262 International Business Management

Global trade, policies, and regulations; regional economic integration and the utilization of preferential trade agreements; trade barriers and the impacts on international trade; the regulations on export procedures; customs formalities; harmonization system; INCOTERMS; obligations under sale, insurance, carriage, and letter of credit contracts

#### **ICMI 352 Diversity, Cross Culture and Expatriate Management**

**4 (4-0-8)**

**Prerequisites:** ICMB 236 Human Resource Management, ICMB 262 International Business Management

Theories and concepts of diversity and inclusion; surface-level diversity; generation; gender diversity; deep-level diversity; personality and values; meanings and dimensions of culture and cultural differences across the globe; analysis of similarities and differences in cultures and value systems and the impact on management practices; organizational cultures and diversity; cross-cultural communication and negotiation; management decision and control across cultures; motivation and leadership across cultures; an expatriate assignment; contemporary issues in expatriate management

#### **ICMI 355 Leadership and Change Management in Global Business**

**4 (4-0-8)**

**Prerequisites:** ICMB 260 Management and Organizational Behavior, ICMB 261 Human Resources Management

Theories and concepts of leadership and change management in a global business context; leadership styles and their impact on organizational change; managing change processes in multinational organizations; the role of culture and communication in global leadership; strategies for leading diverse teams across

different cultural backgrounds; decision-making and problem-solving in a rapidly changing business environment; ethical considerations in leadership and change management; case studies and best practices in global business transformation.

#### **ICMI 356 ESG in Global Business and Sustainability**

**4 (4-0-8)**

**Prerequisites:** ICMB 262 International Business Management, ICMB 351 Business Ethics and Sustainability  
Corporate sustainability and implications for global business; Harmonizing sustainability through effective stakeholder management, corporate governance as foundation of sustainability, Environmental risks and opportunities; Social risks and opportunities, Sustainability commitment, Value chain and stakeholder analysis process, ESG disclosure, ESG in practice and professional pathways

#### **ICMI 357 Advancing Diversity, Equity, Inclusion, and Belonging (DEIB) in International Business**

**4 (4-0-8)**

**Prerequisites:** ICMB 260 Management and Organizational Behavior, ICMB 261 Human Resources Management

Introduction to DEIB; Understanding bias and discrimination; Cultural competence, sensitivity, and diversity depths; Inclusion strategies in business and generational diversity; Equity in organizational practices; Addressing workplace discrimination and harassment; Diversity and global business; The role of technology in DEIB; Psychological safety and belonging; Measuring DEIB efforts

#### **ICMI 358 People Analytics for Global Operations**

**4 (4-0-8)**

**Prerequisites:** ICMB 260 Management and Organizational Behavior, ICMB 261 Human Resources Management

Strategic human capital management, people analytics in a global business context, transforming HR practices through data sets, enhancing decision-making, strategic interventions, creating value in business, knowledge, and tools to navigate in international business dynamics

#### **ICMI 359 International Business Negotiation**

**4 (4-0-8)**

**Prerequisites:** ICMB 262 International Business Management

Negotiation processes, styles and conflict management; impact of different cultures on negotiation approaches, behaviors, strategies and tactics; international business negotiation strategy and planning; perception, cognition and emotion in international business negotiations; cross-cultural communication; the use of power and trading concessions; price negotiations and closing business negotiations

**ICMI 450 International Finance and Risk Management for International Business** **4 (4-0-8)**

**Prerequisites:** ICMB 257 Business Finance for Entrepreneur, ICMB 262 International Business Management Studies of international finance from the standpoint of multinational company. An Introduction to the derivatives used for multinational company, investment in foreign operation, management of funds and financing strategies for foreign operation. Examination of risk in international business, identification of strategies to identify, assess, manage, and mitigate risk associate with global business operation, management of funds

**ICMI 451 Global Strategy** **4 (4-0-8)**

**Prerequisites:** ICMI 351 Global Trade, Policies and Regulations

Globalization and Internationalization Strategies; Internationalization Strategy Management and Process; Vision, Mission and Strategic goals; entrepreneurial internationalization approaches, opportunity creation and evaluation; internationalization and governance; internationalization of a value proposition and business model; international strategic initiatives; host market analysis; international business and marketing strategy; financial rational and risk management of alternative international strategic initiatives; internationalization action plan

**ICMI 452 Special Topics in International Business** **4 (4-0-8)**

**Prerequisites:** ICMB 262 International Business Management, ICMB 260 Management and Organizational Behavior

Contemporary issues; industry trends; theories and best practices in international business in response to the changing business environment

**ICMI 455 Sustainable Innovation & Entrepreneurship** **4 (4-0-8)**

**Prerequisites:** Completed 20 credits of all IB major required courses **AND** obtained a minimum of 150 credits

Theoretically well-founded thesis project; identify the theoretically well-founded topic of the thesis project identifying the research topic; formulating the research question; thesis goals definition; identifying and critiquing relevant academic literature; locating and evaluating data writing the thesis proposal, thesis draft; incorporating feedback and making revisions; writing the final thesis; revising thesis draft into final thesis

**ICMK 372 Market Intelligence – A Quantitative Approach** **4 (4-0-8)**

**Prerequisites:** ICMB 152 Business Statistics, ICMB 259 Principles of Marketing

Marketing research tools; impacts of data, insights, and marketing decisions; research process; defining research problem, designing research approach; data collection; descriptive statistics; inferential statistics; modelling; reporting quantitative research

**ICMK 373 Consumer Behavior and Decision Making** **4 (4-0-8)**

**Prerequisites:** ICMK371 Consumer Insights – A Qualitative Approach

Study of consumer behavior, the decision-making process, psychological responses, and sociological influences on the consumer decision; consumer decision and its impact on marketing decision; formulation of marketing strategy in response to consumer decision behavior

**ICMK 379 Digital Marketing** **4 (4-0-8)**

**Prerequisites:** ICMB 259 Principles of Marketing

An overview of digital marketing; online marketplace analysis—macro and micro environment; online customer personas and decision journey; digital marketing process; objective and budgeting for digital marketing program; digital marketing tools; developing a digital marketing program; evaluation of digital marketing project

**ICMK 479 Marketing Strategy for Sustainability** **4 (4-0-8)**

**Prerequisites:** Completed at least 124 credits

Micro-environment analysis; opportunity and challenge analysis; vision and mission; branding strategy, product strategy, pricing strategy, distribution strategy, communication strategy, innovation strategy, growth strategy, competitive strategy; sustainability concept; sustainability impact assessment.

**ICMK 380 Societal Marketing** **4 (4-0-8)**

**Prerequisites:** ICGC 2xx

Societal marketing, ethical marketing; cause marketing, cause-related marketing; purpose-driven strategies; stakeholder engagement; sustainable marketing; community well-being; social media advocacy; health awareness campaigns; environmental marketing campaigns; impact measurement

**ICPY 251 Mechanics I** **4 (4-0-8)**

**Prerequisites:** ICPY 101 Physics I

Newton's law of motion, conservation laws of energy and momentum, linear and rotational dynamics, central force, oscillation, mechanical wave, rigid body dynamics, non-inertial frame of reference, Coriolis effect

**ICPY 271 Mathematical Methods in Physics****4 (4-0-8)****Prerequisites:** ICPY 101 Physics I **AND** ICMA 218 Multivariable Calculus

Examples of solving physics problems using Complex numbers, Contour Integrals, residue theorem, system of linear equations, matrix, Eigenvalues and Eigenvectors, differential equations, Fourier analysis; probability theory and statistics, Bayesian statistics, error estimation and resample

**ICPY 291 Introductory Electromagnetism****4 (4-0-8)****Prerequisites:** ICPY 102 Physics II

Coulomb's law, electric fields and potential, Gauss's Law, conductors, multipole expansion, electric-field in matter, Biot-Savart Law, Ampere's Law, vector potential, magnetic field in matter

**ICPY 334 Numerical Methods****4 (4-0-8)****Prerequisites:** ICCS 111 Programming and Abstractions **AND** ICMA 106 Calculus I

Taylor's Theorem, Numerical Derivative and Integral, Least Square Fitting, Solving System of Linear and Non-linear Equation Numerically, Optimization, Monte Carlo Simulations

**ICPY 342 Integrated Laboratory in Physics II****2 (0-4-2)****Prerequisites:** ICPY 105 Integrated Laboratory in Physics I

Measurements and propagation of errors; Proving phenomena predicted by mathematical models; experiments in electricity and magnetism, analog circuit design

**ICPY 343 Integrated Laboratory in Physics III****2 (0-4-2)****Prerequisites:** ICPY 105 Integrated Laboratory in Physics I

Data acquisition and data analysis techniques, frequency discriminator; Finite element analysis techniques; Spectrometry

**ICPY 351 Mechanics II****4 (4-0-8)****Prerequisites:** ICPY 251 Mechanics I

Lagrangian Mechanics, variational calculus, Hamilton's Equations of Motion, Special relativity, Lorentz transformation, velocity and momentum transformation

**ICPY 361 Quantum Mechanics I****4 (4-0-8)****Prerequisites:** ICPY 102 Physics II

History of quantum mechanics, wave and particle duality, Schrödinger's equation and wave function of infinite square well, Dirac potential, free particle, quantum harmonic oscillator, eigenfunctions of Hermitian operators, virial theorem, Hilbert space, uncertainty principle

**ICPY 355 Special Topics in Physics I** 4 (4-0-8)

**Prerequisites:** None

Topics of current interest

**ICPY 356 Special Topics in Physics II** 4 (4-0-8)

**Prerequisites:** None

Topics of current interest in physics

**ICPY 357 Special Topics in Laboratory Physics I** 4 (3-2-7)

**Prerequisites:** None

Topics of current interest in laboratory physics

**ICPY 371 Thermal Physics** 4 (4-0-8)

**Prerequisites:** None

The laws of thermodynamics, heat engines, entropy, the axiomatic formulation of thermodynamics

**ICPY 391 Electrodynamics and Optics** 4 (4-0-8)

**Prerequisites:** ICPY 291 Introductory Electromagnetism

Faraday's Law, circuit analysis, radiation from dipoles and moving charges, Maxwell's equations, EM waves: transmission, reflection and refraction, geometric optics, guided wave, diffraction and interference of waves

**ICPY 452 Statistical Mechanics** 4 (4-0-8)

**Prerequisites:** ICPY 361 Quantum Mechanics I

Statistical physics, distributions and probability, Boltzmann's Factor, partition and grand partition functions, Ising's Model, quantum statistics

**ICPY 455 Special Topics in Physics III** 4 (4-0-8)

**Prerequisites:** None

Topics of current interest in physics

**ICPY 456 Special Topics in Physics IV** **4 (4-0-8)**

**Prerequisites:** None

Topics of current interest in physics

**ICPY 457 Special Topics in Laboratory Physics II** **4 (3-2-7)**

**Prerequisites:** None

Topics of current interest in laboratory physics

**ICPY 461 Quantum Mechanics II** **4 (4-0-8)**

**Prerequisites:** ICPY 361 Quantum Mechanics I

The hydrogen atom, the angular momentum, spin, two identical particle systems, Time-Independent Perturbation Theory, Scattering

**ICPY 471 Atomic and Molecular Physics** **4 (4-0-8)**

**Prerequisites:** None

One-electron atoms, Helium atom, multi-electron atoms; structure and spectra of molecules, atomic spectroscopy methods; excitations of atoms and molecules by photons and electrons

**ICPY 472 Solid State Physics** **4 (4-0-8)**

**Prerequisites:** None

Periodic structure and symmetries of crystals, diffraction, reciprocal lattice; chemical bonding, lattice dynamics, phonons, thermal properties; free electron gas, the band theory, applications in metals and semi conduction materials

**ICPY 473 Nuclear Physics** **4 (4-0-8)**

**Prerequisites:** None

The nuclear structure, nuclear forces, radioactive decay, nuclear reaction, fission, fusion, nuclear detection and measurement; applications of radioactivity, fundamental particles and interactions; classification by quantum numbers, isospin concept, symmetries, conservation laws, the quark model

**ICPY 474 Astrophysics** **4 (4-0-8)**

**Prerequisites:** None

Celestial mechanics, Kepler's Laws of Motion, Virial Theorem; Blackbody Radiation, the Quantization of Energy, Dual Property of Light; Telescopes, IR, UV X-Ray, gamma ray astronomy; spectra and the classification

of stars, the Jeans density, the interiors of stars, hydrostatic equilibrium, nucleosynthesis, Hertzsprung-Russell Diagram, the main sequence, stellar evolution, white dwarf, neutron stars, supernovae, and stellar black hole

#### **ICPY 475 Plasma Physics**

**4 (4-0-8)**

**Prerequisites:** None

Saha's Formula, the elementary statistical interpretation, the guiding center motion; Maxwell's Equation approach, Vlasov Equations, the Magnetohydrodynamic Equations

#### **ICPY 484 Cosmology**

**4 (4-0-8)**

**Prerequisites:** None

The Newtonian Cosmology; the Homogeneous Isotropic Universe, Friedmann Equations; The Einstein-de Sitter Model, modification due to General Relativity; gravitational instability, density perturbation and evolution, the nonlinear structure evolution, dark matter halos; the cosmic microwave background and measurement, the beginning of the universe, cosmological parameters and the dark energy

#### **ICPY 486 Observational Astronomy**

**4 (4-0-8)**

**Prerequisites:** None

An overview of observational techniques used in Astronomy; basic techniques for obtaining and analyzing data from modern optical instruments; geometrical optics, optical design and instrumentation

#### **ICPY 487 Data Analysis in Astronomy**

**4 (4-0-8)**

**Prerequisites:** None

Types of astronomical data, basic statistics and sources of error; basic computer programming (C++, Python, IDL, SQL, etc.), data acquisition, methods used in astronomical data sets; the parameter estimation and model fitting, the Monte Carlo Method, Big Data handling techniques; the principal component analysis, the density estimation, classification techniques and neural networks, an interpretation of astronomical measurement

#### **ICPY 488 Special Topics in Astronomy**

**4 (4-0-8)**

**Prerequisites:** None

Current research in astronomy; topics including Instrumental Science for the astronomical observation; limit and sensitivity in the electromagnetic wave and the gravitational wave observation

**ICPY 490 Computational Physics****4 (4-0-8)****Prerequisites:** None

Ordinary differential equations: stability, order and chaos in the two- dimensional motion; the boundary value and eigenvalue problems: stationary solutions of the one-dimensional Schroedinger Equation; partial differential equations with different types of boundary conditions: the timedependent Schrodinger Equation, heat transfer, diffusion, wave, and Laplace Equation; Monte Carlo Methods: the Ising Model in two dimensions; the Discrete Fourier Transform and Fast Fourier Transform: diffraction, image processing

**ICPY 492 Electronics****4 (4-0-8)****Prerequisites:** ICPY 102 Physics II

Microcontroller and Programming, circuit design and analysis, electrical components, networking, and analog circuit

**ICPY 496 Biophysics****4 (4-0-8)****Prerequisites:** ICBI 101 Biology

Introduction to biophysics; physical methods in the study of biological systems, including molecular and cellular biology; mathematical modeling of biological phenomena; applications of physics to biology; instruments in biophysics

**ICSP 113 General Psychology****4 (4-0-8)****Prerequisites:** None

Introduction to various topics, theories, and approaches in the scientific study of behaviour and mental processes; important psychological principles within the major subfield of psychology; biological bases of behaviour, cognition, intelligence, emotions, learning, human development, health, psychological disorders, and psychotherapy; application of various aspects of psychology to different contexts.

**ICSP 253 Introduction to Social Psychology****4 (4-0-8)****Prerequisites:** None

Social cognition and social perception; attribution; attitudes; socialization, self-esteem and the self-concept; social behaviour; interpersonal attraction; conformity and obedience; aggression; altruism; group processes; collective decision making; leadership

**ICSP 254 Theories of Personality****4 (4-0-8)****Prerequisites:** None

Diverse views of human nature; the analysis of personality; Basic qualities and dispositions; characteristic ways of behaving; theoretical approaches to human personality; trait theory; the determinants of behaviour; psychodynamic and cognitive approaches

**ICSP 255 Introduction to Abnormal Psychology 4 (4-0-8)**

**Prerequisites:** None

The definition, assessment, and classification of abnormal behaviour; historical approaches to the understanding and treatment of abnormal behaviour; psychotherapies and biological treatments

**ICSP 256 Industrial and Organizational Psychology 4 (4-0-8)**

**Prerequisites:** None

Work-related attitudes; social influences at work; job satisfaction; work groups; matching workers with jobs

**ICSP 257 Educational Psychology 4 (4-0-8)**

**Prerequisites:** None

An introduction to the study of human learning in the educational context; motivation, learning mechanisms, knowledge structures and intelligence, measurement and evaluation as related to teaching processes

**ICSP 258 Cross-Cultural Psychology 4 (4-0-8)**

**Prerequisites:** None

The role of culture in the study of behaviour; psycho-social development, social behaviour, personality and cognition in cross-cultural perspective; theoretical and methodological issues

**ICSP 259 Developmental Psychology 4 (4-0-8)**

**Prerequisites:** None

Fundamental principles of developmental psychology; lifelong, multidimensional, multidirectional of lifespan developmental perspectives; factors influencing development; theories, perspectives and research methods in developmental psychology; research in physical, cognitive, emotional, and social aspects of development from conception to death; practical applications in everyday lives knowledge to real world issues

**ICSP 260 Psychology of Memory 4 (4-0-8)**

**Prerequisites:** None

Theories, research, and application of the psychology of memory; different types of memory; cognitive and neural mechanisms of memory; factors influencing memory and memory performance; techniques and strategies for enhancing memory performance; the applications of knowledge and research of memory in clinical and educational practices

**ICSP 261 The Psychology of Paranormal Belief**

**4 (4-0-8)**

**Prerequisites:** None

Definition and classification of types of parapsychological phenomenon; research methods used in investigating the paranormal; historical approaches to understanding paranormal beliefs across cultures; anomalous experiences; states of consciousness; exceptional experiences in psychology; individual and cultural factors influencing paranormal beliefs

**ICSP 262 Coaching Psychology**

**4 (4-0-8)**

**Prerequisites:** None

An introduction to theoretical frameworks that guide coaching; coaching skills; the relationship between coach and coachee; and coaching applications for personal development, relationship development, career development, health and well-being, and mindfulness

**ICSP 263 The Science of Happiness and Flourishing**

**4 (4-0-8)**

**Prerequisites:** None

Theoretical models of happiness and human flourishing; methodological issues; theory and research into character strengths, gratitude, emotional regulation, growth mindset, mindfulness, achievement and resilience; current findings on positive psychological interventions; methods for personal applications; contexts where positive interventions can be effective, such as self-care, therapy, education, and coaching; positive organizations; approaches to national happiness

**ICSP 350 Evolutionary Psychology**

**4 (4-0-8)**

**Prerequisites:** None

An introduction to evolutionary psychology; behavioral strategies as a means of evolutionary survival; sex and reproduction; child rearing; conflict and aggression; cooperation; status, prestige and social dominance

**ICSP 352 Prosocial and Antisocial Behaviour**

**4 (4-0-8)**

**Prerequisites:** None

The psychological and anthropological understanding of prosocial and antisocial behaviours; altruism and helping; aggression and violence; theoretical approaches and debates

**ICSP 353 Clinical Psychology**

**4 (4-0-8)**

**Prerequisites:** None

The use of psychological assessment methods and psychotherapeutic approaches in the treatment of individuals with psychological problems; theoretical approaches and issues

**ICSP 354 Psychological testing**

**4 (4-0-8)**

**Prerequisites:** None

Introduce the field of psychological assessment and testing, explore the history, roles, and issues involved in the field of psychological assessment, cover principles of psychometrics and statistics, the applications of assessment in various contexts as well as an examination of particular tests, such as the Rorschach, WAIS, and MMPI

**ICSP 357 Psychology of Motivation**

**4 (4-0-8)**

**Prerequisites:** None

The definition, assessment, and classification of theories related to the psychology of motivation. Theories of the psychology of motivation in the fields of cognition, neuropsychology, behavioural studies and emotions

**ICSP 359 Foundations of Counseling Skills**

**4 (4-0-8)**

**Prerequisites:** None

An overview of the basic concepts; history; process of counseling; skills in CBT; mechanisms of change; and applications of the major schools of counseling and psychotherapy

**ICSP 360 Psychology of Marketing and Consumer Behavior**

**4 (4-0-8)**

**Prerequisites:** None

The psychology of motivation; emotions; social influence; cognition; learning; memory; and ethics in marketing and economic decision-making; practical skills in market research; data analysis; and digital marketing tools and technologies

**ICSP 361 Overcoming Stereotypes, Prejudice and Discrimination**

**4 (4-0-8)**

**Prerequisites:** None

Analysis of psychological theories; psychological approaches to stereotypes, discrimination and prejudice; the emotional, behavioral and cognitive implications; the impact on our behavior and society; debiasing and metacognition

**ICSP 362 The Psychology of Emotional Well-being 4 (4-0-8)**

**Prerequisites:** None

The experience of emotional well-being; Biological, developmental, social and cognitive aspects of emotional well-being; specific emotions in psychological perspective: happiness, sadness, fear, anger, shame, guilt, disgust, love, empathy/sympathy

**ICTB 202 Principles of Management 4 (4-0-8)**

**Prerequisites:** None

Overview of management and organizational behavior; evolution of management theories and thoughts; changing environment of organizations; foundation of individual behaviors; motivation; stress and work-life balance; decision making and problem solving; teamwork; communication; leadership; organization structure; ethics and social responsibility; service economies; organizational culture and change

**ICTB 203 Consumer Behavior for Travel and Service Businesses 4 (4-0-8)**

**Prerequisites:** ICTB 219 Introduction to Travel and Service Businesses

Understanding a wide range of factors motivate consumers in tourism products; emphasis on culture and multicultural communication and relation; various factors that contribute to successful marketing in tourism; the purchase-decision process; typologies of tourist behavior from different practitioners; patterns of tourism demand and markets, divided by global region

**ICTB 204 Business Communication 4 (4-0-8)**

**Prerequisites:** ICGC 103 Public Speaking

Communication model; principles of business writing; business presentation; memos, emails and letters; business pitching; business negotiation dialogue; approaches of negotiation; cross-cultural communication; press release; country briefings; resume and cover letter; interview preparation; a mock interview

**ICTB 212 Marketing for Travel and Service Businesses 4 (4-0-8)**

**Prerequisites:** None

What is marketing; marketing plan, marketing macro environment; direct and indirect competitors; suppliers as business partners; market segmentation and targeting; consumer behavior; using marketing information;

products and services; physical existence; location; promotion mix; pricing products; marketing channels; ethical issues in marketing

#### **ICTB 213 Economics for Travel and Service Businesses**

**4 (4-0-8)**

**Prerequisites:** ICTB 218 Business Statistics

Principles of economics, particularly microeconomics, and applied economic concepts; assessing the socio-economic behaviors of economic agents comprising consumers, businesses, government and its agencies, particularly their business choices and decision making; covering key economic areas of demand, supply, elasticity, costing, pricing and investment

#### **ICTB 214 Accounting for Travel and Service Businesses**

**4 (4-0-8)**

**Prerequisites:** None

Business transactions and financial statements; evolution of accounting; recording and classifying financial transactions; preparations of financial statements; characteristics of various types of accounts; accounting principles; the usefulness and limitations of accounting information

#### **ICTB 216 Sustainable Development in Travel and Service Businesses**

**4 (4-0-8)**

**Prerequisites:** ICTB 219 Introduction to Travel and Service Businesses

Concepts of tourism and sustainable development goals; sense of global citizenship; sustainability affecting travel and service business; socio-cultural, environmental, economic impacts of tourism; visitor management and an interpretation for the sustainable development; creative tourism for promoting culture-based creativity and sustainability of travel and service business; concepts of community-based tourism practices for the sustainable development within a different geo-cultural context – urban and rural settings; the Global Code of Ethics

#### **ICTB 217 Digital Marketing for Travel and Service Businesses**

**4 (4-0-8)**

**Prerequisites:** ICTB 212 Marketing for Travel and Service Businesses

Introduction to Digital Marketing; Digital Marketing Strategies; Content Marketing; Social Media Marketing; Search Engine Optimization (SEO); Pay-Per-Click (PPC); Influencer Marketing; Analytics and Data-Driven Marketing; Customer Relationship Management (CRM); Emerging Trends in Digital Marketing.

#### **ICTB 218 Business Statistics and Data Management**

**4 (4-0-8)**

**Prerequisites:** None

Descriptive statistics; inferential statistics; normal distributions; an estimation of parameters; an analysis of variance; correlation and regression; non-parametric methods; the design of experiments; hypothesis testing; collection of data; presentation of data

#### **ICTB 219 Introduction to Travel and Service Businesses**

**4 (4-0-8)**

**Prerequisites:** None

Introduction and overview of the Travel and Service Businesses, partnership in Travel and Service Businesses, global issues in Travel and Service Businesses, dynamics of the lodging industry, hotel management and operations, the foodservice concepts, dynamics of the event industry, leisure activities in tourism and hospitality, health and wellness, and passenger transportation, introduction to the Global Code of Ethics

#### **ICTB 221 Room Division Operation Management**

**4 (4-0-8)**

**Prerequisites:** None

Understanding of front office operations and management in a hotel; presenting a systematic approach to front office procedures by detailing the flow of business through a hotel from the reservations process to check-out and account settlement; examining the various elements of effective front office management paying particular attention to the planning and evaluation of front office operations to human resources management; studying front office procedures and management within the context of the overall operation of a hotel; management of housekeeping duty within one's own establishment; supervision and training of staff scheduling; using different cleaning agent; safety within the work environment; housekeeping technology and legendary quality service standards

#### **ICTB 222 Facility Management for Hotel Operations**

**4 (4-0-8)**

**Prerequisites:** None

An overview of hotel facilities and hotel departments in charge, operating costs of facilities; types and characteristics of the major building system; sustainable management for hotel facilities; hotel renovation needs; provision and maintenance of hotel information technology systems; workload planning for facilities operations; health, safety and security concerns for facilities operations; relationship between the facilities management and the operation management

#### **ICTB 223 Hospitality Facilities Design**

**4 (3-2-7)**

**Prerequisites:** None

Fundamental of the hospitality facility design and layout emphasizing different types of lodging in the perspectives of managements and owners; different types of hospitality facilities; basic understanding of

architectural plan reading and specifications; how to communicate with professional designers; flow patterns and relationships among functional areas, facilities, service and management (using bubble diagram); hospitality space design: guestroom design; phases in the planning and design process; possible key factors, theme or concept, and trends influencing hospitality facilities design in terms of the investment

#### **ICTB 224 Special Topics in Hotel Management**

**4 (4-0-8)**

**Prerequisites:** None

Selected topics in the hotel and hospitality industry. An analysis of contemporary issues that arise and impact on the hotel and hospitality industry

#### **ICTB 231 Culinary Operation Management**

**4 (3-2-7)**

**Prerequisites:** None

Planning and operating food and beverage productions in quantity food settings; various methods of food preparations; ingredients and culinary terminology; reading and evaluating menus; developing recipe conversions and costing skills; examining different production schemes and product flow; designing the kitchen layout; using and taking care of equipment; service techniques; procurement management, and the cost control

#### **ICTB 232 Baking and Pastry Business**

**4 (3-2-7)**

**Prerequisites:** None

Basic theory and skill sets used throughout the field of baking and pastry; using hand tools and equipment found in a bakeshop; exploring the baking and pastry ingredients and their functions; describing of the major methods such as beating, blending, creaming, cut in and folding; understanding the course materials by tasting and evaluating products created in class; identifying and selecting quality grains, fruits, vegetables, thickening agents, nuts and seeds, dairy products, baking spices, eggs and egg products, flours, chocolates, fats, and oils used in the baking field; business of baking and pastry

#### **ICTB 233 Gastronomy Exploration and Food's Experiences**

**4 (4-0-8)**

**Prerequisites:** None

Understanding the contexts of gastronomy related to food and culture, where the food experiences are related to several dimensions; understanding the gastro-diplomacy strategies to support from “Farm to the World” and “Thai Kitchen to the World Kitchen Campaign”; Thai food popularity leading to food tourism destination; exploring the relationships of Thai food from the supply side to the demand side; tourist's engagement in a different food supply chain with sustainable development; Discussing Thai food story;

understanding the background of food culture and heritage of Thailand in relation to history, indigenous groups, religions and the geographical analysis

#### **ICTB 234 Restaurant Marketing and Branding Strategies**

**4 (4-0-8)**

**Prerequisites:** None

Describing the various forms of the restaurant business; discussing about advantages and disadvantages of each form of business; understanding the major elements of marketing and branding strategies; defining the concept of branding and its value in marketing and promotions; examining the relationship between the sales promotion and the marketing program; planning and implementing marketing and branding program for a specific restaurant operation

#### **ICTB 235 Special Topics in Food & Restaurant Management**

**4 (4-0-8)**

**Prerequisites:** None

Selected topics in the Food & Restaurant Management. An analysis of contemporary issues that arise and impact on the food and restaurant related industry

#### **ICTB 241 Travel Guide and Interpretation**

**4 (3-2-7)**

**Prerequisites:** None

A series of means for the travel communication; duties and responsibilities of tour guides; legal requirements for tour guiding; principles of tour guiding; understanding cultural sensitivity; definition of interpretation; significance of interpretation; principles of interpretation; thematic interpretation; different types of interpretation; concept of creating visitor experiences; essential knowledge of cultural heritage in Thailand, especially during Ayutthaya to the Bangkok Modernity Period, including a field work held at outstanding tourist attractions in Bangkok; the role of influencers in the travel communication; blogging and sharing the travel information

#### **ICTB 242 Tourism Package Management and Business**

**4 (3-2-7)**

**Prerequisites:** None

Crucial relationships of various tour business components such as transportation, lodging, dining, sightseeing, attractions and shopping; understand different types of tour operators as well as basic types of organizational structures; identify tour distribution channels and appreciate the ways in the destination research, development, and supply negotiations; the role of online travel agency (OTA); device and develop tour itinerary planning and understand how to strategically price the tour, specific communications strategies of tour operators; the application of digital marketing tool; understand the three major functions of tour

operations: pre-tour operation, tour execution, and post-tour phase and last appreciation; an administration of tour operation and its environment

#### **ICTB 243 Online Travel and Service Business**

**4 (4-0-8)**

**Prerequisites:** None

Understanding roles of the online travel and service business in the tourism system; opportunities and challenges of online travel and service business; the value chain of online travel and service business; digital solutions for travel and service business; Online Travel Agency (OTA) and online intermediary business; the Global Distribution System (GDS) functionality; online distribution channels; the OTA business model; customer relationship management for OTA

#### **ICTB 244 Wine Studies and Wine Tourism**

**4 (3-2-7)**

**Prerequisites:** Age above 20

Viticulture; viniculture; old world and new world wine; still wines; sparkling wines; fortified wines; sweet wines; food and wine pairing; wine business; principles of wine tourism; motivations of wine tourists; attracting wine tourists; marketing plan

#### **ICTB 245 Cultural Heritage Studies for Entrepreneurship**

**4 (4-0-8)**

**Prerequisites:** None

The importance of culture and tourism entrepreneurship; to recognize the socio-cultural complexities of the cultural heritage tourism; a working relationship between UNESCO World Heritage sites and local tourism economies; to develop sustainable development in cultural heritage sites; to plan immersive experiences for interpretation and reconstruction of heritage sites

#### **ICTB 246 Special Topics in Tourism Management**

**4 (4-0-8)**

**Prerequisites:** None

Selected topics in Tourism Management. An analysis of contemporary issues that arise and impact on the tourism industry

#### **ICTB 251 Event Planning and Operation**

**4 (4-0-8)**

**Prerequisites:** None

Event industry overview; event architecture; event feasibility; event product development; event proposal; budgeting and monitoring; contracts and collaborations; supply chain management; team management; risk management; site selection and management; onsite coordination; event evaluation

#### **ICTB 252 Event and Experience Design**

**4 (3-2-7)**

**Prerequisites:** None

Understanding an overview of event design; the formation and construction of experience; key design of experience; the relationships between event interaction and experience; the relationships between communication and event design; conceptualization and planning; process of event design operations; entertainment design; designing sustainable event; involving technology in event to enhance experience; evaluating event design; event design in consideration of event legacy; Identifying and finding current and examine future trends in event design

#### **ICTB 253 Event Business Stakeholders Engagement**

**4 (4-0-8)**

**Prerequisites:** None

Understanding overall picture and detailed engagement of event business stakeholders' connection, collaboration and competition (3Cs) including events' target business sectors, target audiences; Destination Management Company (DMC); Professional Convention Organizer (PCO); Professional Exhibition Organizer (PEO); venue (i.e., exhibition/convention center, hotel, multipurpose facility, unusual venue); supporting infrastructure (i.e, Convention and Visitor Bureau (CVB), international associations, domestic associations), communities, and service providers

#### **ICTB 254 Leisure and Sport Event**

**4 (3-2-7)**

**Prerequisites:** None

Basic understanding of the sport, lifestyle, recreation, and festive event industry; types and conceptualization of events; application of event management concept in sport and leisure events; sponsorship strategies and management; legal and ethical principles applied to sport and leisure event; entertainment management in sport and leisure event; volunteer management; crowd management; risk and crisis management specific to sport and leisure events; key criteria for evaluation in sport and leisure event

#### **ICTB 255 Special Topics in Event Management**

**4 (4-0-8)**

**Prerequisites:** None

Selected topics in Event Management. An analysis of contemporary issues that arise and impact on the tourism industry

#### **ICTB 261 The Basics of Exercise Science and Wellness**

**4 (4-0-8)**

**Prerequisites:** None

Physiological and psychological understanding of the body and mind in respond to physical activity; training principles; basic anatomy; sports nutrition; sports biomechanics; strength and conditioning; basics of injury prevention, treatment, and rehabilitation

#### **ICTB 262 Principles and Practice of Sport management for Business**

**4 (4-0-8)**

**Prerequisites:** None

Foundations to sport management; history, management, marketing, financial, economic, legal and ethical principles applied to sport management; amateur sport industry; professional sport industry; sport industry support segment; lifestyles and leisure sports; career preparation

#### **ICTB 263 Healthcare and Medical Business**

**4 (4-0-8)**

**Prerequisites:** None

Healthcare business system and environment; contemporary business themes in healthcare and medical policy and practice; vulnerable population and potential demands; healthcare and service operations; healthcare products & services; entrepreneurship in healthcare and medical

#### **ICTB 264 Special Topics in Health & Wellness Management**

**4 (4-0-8)**

**Prerequisites:** None

Selected topics in Health & Wellness Management. An analysis of contemporary issues that arise and impact on the Health & Wellness industry

#### **ICTB 301 People and Talent Management**

**4 (4-0-8)**

**Prerequisites:** ICTB 202 Principles of Management

Overview and survey of human resources management and development; differences of personnel and human resources administrative system, recruitment and selection, job design, training and development together with talent management, performance and compensation management, ethics management and labour relation

#### **ICTB 302 Business Laws for Travel and Service Businesses**

**4 (4-0-8)**

**Prerequisites:** ICTB 219 Introduction to Travel and Service Businesses

Legal principles and rules as infrastructure of legal knowledge towards the operation of travel and service businesses in the tourism and hospitality industry; encouraging legal awareness in various legal exposures and managing legal issues including developing solutions and preventive measures thereof

**ICTB 303 Digital Transformation for Travel and Service Businesses** 4 (4-0-8)

**Prerequisites:** ICTB 219 Introduction to Travel and Service Businesses

Introduction to information technology and digital technology, strategic thinking and digital technology, digital landscape and ecosystem, the Internet and digital tourist, social media, mobile technology, digital technology for travel business, digital technology for service business, digital technology and sustainable development, and future of digital technology for travel and service business entrepreneurship

**ICTB 304 Service Management and Experience Design** 4 (4-0-8)

**Prerequisites:** ICTB 219 Introduction to Travel and Service Businesses

Important roles of services in our economy; the nature of services and service encounters; characteristics of services; customer focus on service management; experiential design in service businesses; consumer decision model; service psychology; service strategy and competitiveness; design and development of services and service delivery systems; service failure and recovery; managing demand and supply in services; service quality and continuous improvement; tools and technique for total quality improvement; managing customer experience

**ICTB 311 Finance for Travel and Service Businesses** 4 (4-0-8)

**Prerequisites:** ICTB 214 Accounting for Travel and Service Businesses

An introduction to the financial management for travel and service businesses; methods and importance of tourism and hospitality finance; cash management and its importance; the investment decisions regarding travel and service business projects and capital expenditures; cash control during the various stages of operations; statement of cash flow; an introduction to feasibility studies; the financial ratios analysis and working capital

**ICTB 312 Strategic Management for Travel and Service Businesses** 4 (4-0-8)

**Prerequisites:** 100 credits

Entrepreneurial and strategic issues in management; formulation and analysis of strategies; relationship between strategies and organisational structures; strategic thinking and managing change and the similarities and differences in strategies between sectors in relation to travel and service businesses; crisis and risk handling; ethics in business

**ICTB 313 Business Research and Data Analysis for Travel and Service Businesses** 4 (4-0-8)

**Prerequisites:** 100 credits AND ICTB 218 Business Statistics and Data Management

Foundation for a solid research based solution approach to issues as present in the travel and service businesses; to understand a range of approaches to the issues as derived from the academic literature to apply specific theoretical frameworks; to provide design of experiments; collection of data; presentation of data; analysis of current trends in research industry; analyse the research results and supply a range of solutions

#### **ICTB 314 Revenue Management in Travel and Service Businesses**

**4 (4-0-8)**

**Prerequisites:** 100 credits

The concepts of revenue management; ingredients of effective revenue management; roles of revenue manager and related department; key performance index used in revenue management; market segmentation and channel distribution in revenue management; market and competitive intelligence; benchmarking and competitive set; price & value; economics in revenue management; demand forecasting; revenue management techniques in travel and service business; market dynamic

#### **ICTB 315 Entrepreneurship and Business Plan Development**

**4 (4-0-8)**

**Prerequisites:** 100 credits

Evaluate new business ideas; financial statements and ratios; formulate a business strategy for the new venture; careful market selection and positioning of products; compose a business plan; effectively communicate and sell new business concepts

#### **ICTB 316 Data Analytics for Travel and Service Businesses**

**4 (4-0-8)**

**Prerequisites:** ICTB 218 Business Statistics and Data Management

Introduction to Data Analytics; Data Collection Methods; Data Preprocessing and Cleaning; Exploratory Data Analysis; Data Visualization Techniques; Statistical Methods and Data Analysis; Customer Analytics; Customer Segmentation; Customer Lifetime Value (CLV); Operational Analytics; Marketing Analytics; Data-Driven Decision Making; Ethical and Legal Considerations

#### **ICTB 324 Hotel Business Development and Management**

**4 (4-0-8)**

**Prerequisites:** ICTB 221 Room Division Operation Management **OR** ICTB 222 Facility Management for Hotel Operations

The hotel business development; location selection; legal and tax issues; the business project development plan; an overview of the front and back of the house operations management; expansion and managing multi-unit lodging property; risk and crisis management; understanding and managing the internal stakeholders (i.e. owners, managers, employees, management companies, franchisers); engagement of

external stakeholders including customers, suppliers, competitors, local communities and intermediaries (i.e., distribution channels); proactive and reactive approaches responding to the changing factors of the macroenvironment (i.e., political, economic, socio-cultural, environmental, technological and legislative factors)

#### **ICTB 335 Restaurant Business Planning and Operations**

**4 (4-0-8)**

**Prerequisites:** ICTB 231 Culinary Operation Management **OR** ICTB 232 Baking and Pastry Business

Understanding factors to consider when planning a menu; describing how the menu influences every dimension of the food service operations; listing menu types commonly used in the foodservice operations; selecting an appropriate type of menu for a foodservice business; calculating food cost; discussing various menu pricing strategies; creating an appealing menu for increasing sale; basics of the restaurant design; food safety and sanitation; achieving legal safety and sanitation requirements

#### **ICTB 355 Creative Event Production**

**4 (3-2-7)**

**Prerequisites:** ICTB 251 Event Planning and Operation **OR** ICTB 252 Event and Experience Design

Producing a real event through the application of event conceptualization; event and experience design; sustainability and technology considerations; event budgeting and monitoring; event proposal; event marketing and promotion; event sponsorships; human resources management; event logistics; procurement; site planning, management and communication; onsite coordination; event evaluation

#### **ICTB 364 Spa and Wellness Business**

**4 (4-0-8)**

**Prerequisites:** ICTB 263 Healthcare and Medical Business

Introduction to spa and wellness industry and operations; history of spa and wellness industry, types of spa and wellness centres; latest trends in spa and wellness industry; mind and body; facility design; program settings; asset management; service quality management; human resources management in spa and wellness; promotion and branding for spa and wellness business; spa and wellness financial management; spa and wellness for special populations; self-help plan for a healthy lifestyle

**2025 - 2026**

