

# COURSE COUNSELING

(FOR YEARS 3 & 4 IN 2020-21)

Department of Information Engineering

June 3<sup>rd</sup>, 2020





# OUTLINE

- ▶ IERG & MIEG Curricula
  - ▶ Major required & IE elective courses
- ▶ New IE courses
- ▶ IE courses offered in 2020-21
- ▶ IE Streams of Specialization
- ▶ Discussion on some courses
- ▶ Q&A



# ENGG YEAR 1 MAJOR CORE

## Semester 1

- ▶ **MATH1510**  
Calculus
- ▶ **PHYS1110/1003**  
Engineering Physics I
- ▶ **ENGG1100**  
Engineering Design Lab

## Semester 2

- ▶ **ENGG1410**  
Engineering Mathematics I
- ▶ **ENGG1110**  
Problem Solving by Programming

### One more Faculty Science Course:

Chemistry Courses: CHEM1380

Life Science Courses: LSCI1001, 1003

Physics Courses: PHYS1110, ENGG1310

Other Courses: CSCI1120, CSCI1130



# IERG/MIEG YEAR 2 MAJOR REQUIRED

## Semester 3

- ▶ **ENGG2420 (ENGG2440)**  
Complex Numbers, Differential Equations & Discrete Mathematics
- ▶ **IERG2080 (2 units)**  
Intro. To System Programming
- ▶ **IERG2051 (IERG only)**  
Signals and Systems
- ▶ **IERG2060**  
Basic Analog and Digital Circuits
- ▶ **IERG1810 (1 unit)**  
Electronic Circuits Laboratory
- ▶ **MATH1050**  
Foundations of Modern Mathematics
- ▶ **MATH2010**  
Advanced Calculus I

## Semester 4

- ▶ **ENGG2470 (ENGG2430)**  
Probability for Engineers
- ▶ **IERG2602 (1 unit)**  
Engineering Practicum
- ▶ **CSCI2100**  
Data Structure
- ▶ **ENGG2310**  
Principles of Communication Systems
- ▶ **IERG3820 (1 unit)**  
Communication Laboratory
- ▶ **IERG2051 (MIEG only)**  
Signals and Systems
- ▶ **MATH2020**  
Advanced Calculus II

**FACULTY**

**IERG**

**MIEG (additional)**



# IERG/MIEG YEAR 3 MAJOR REQUIRED

## Semester 5

- ▶ **IERG3310**  
Computer Networks
- ▶ **IERG3800 (1 unit)**  
Information Infrastructure Design Lab
- ▶ **IERG3080**  
Software Engineering and Practices
- ▶ **MATH2050**  
Algebraic Structures
- ▶ **MATH2230**  
Complex Variables with Applications

## Semester 6

- ▶ **IERG3060 (IERG only)**  
Microcontrollers and Embedded Systems
- ▶ **IERG3810 (1 unit, IERG only)**  
Microcontrollers and Embedded Systems Laboratory
- ▶ **MATH2040**  
Linear Algebra II
- ▶ **ENGG2310**
- ▶ **IERG3820**

If not yet taken  
in semester 4

(IERG3060 & IERG3810 are elective  
courses for MIEG)



# IERG/MIEG YEAR 4 MAJOR CORE

## Semester 7

- ▶ IERG4998  
Final Year Project I

## Semester 8

- ▶ CSCI3160 (MIEG only)  
Design & Analysis of Algorithms
- ▶ IERG4999  
Final Year Project II

- **Two-semester Final Year Project (FYP)**
- **Project selection in April for next academic year**
- **Professor suggested topics**
- **Student proposed topics**
- **Poster presentations in December and May**



# MAJOR ELECTIVES

- ▶ **IERG: at least 17 units**
  - ▶ At least 12 units from IE Major Elective List
  - ▶ The rest (5 units) can be either from IE Major Elective List or from 3000-coded courses from all other programmes under Engineering Faculty
- ▶ **MIEG: at least 12 units from the given MIEG major elective lists.**



# IE MAJOR ELECTIVES

- **At least 17 units of IERG Major Electives**
- **At least 12 units from List of IE Major Electives**

<b>CSCI 3150</b>	<b>Introduction to Operating Systems</b>
<b>ENGG 1820</b>	<b>Engineering Internship</b>
<b>IERG 3010</b>	<b>Digital Communications</b>
<b>IERG 3050</b>	<b>Simulation and Statistical Analysis</b>
<b>IERG 3280</b>	<b>Networks: Technology, Economics, and Social Interactions</b>
<b>IERG 3300</b>	<b>Introduction to Stochastic Processes</b>
<b>IERG 3320</b>	<b>Social Media and Human Information Interaction</b>
<b>IERG 3830</b>	<b>Product Design Project</b>
<b>IERG 4030</b>	<b>Optical Communications</b>
<b>IERG 4080</b>	<b>Building Scalable Internet-based Services</b>
<b>IERG 4090</b>	<b>Network Protocols and Systems</b>
<b>IERG 4100</b>	<b>Wireless Communication Systems</b>



# IE MAJOR ELECTIVES

- IERG 4110** Hands-on Wireless Communications
- IERG 4130** Introduction to Cyber Security
- IERG 4160** Image and Video Processing
- IERG 4180** Network Software Design and Programming
- IERG 4190** Multimedia Coding and Processing
- IERG 4210** Web Programming and Security
- IERG 4220** Secure Software Engineering
- IERG 4230** Introduction to Internet of Things
- IERG 4300** Web and Information Analytics
- IERG 4330** Programming Big Data Systems
- IERG 4340** Emerging Technologies in IE
- IERG 4350** Cloud Computing Security
- IERG 4831** Networking Laboratory I
- IERG 4841** Networking Laboratory II



# IE MAJOR ELECTIVES

- IERG 5020** Telecommunication Switching and Network Systems
- IERG 5090** Advanced Networking Protocols and Systems
- IERG 5100** Advanced Wireless Communications
- IERG 5130** Probabilistic Models and Inference Algorithms for Machine Learning
- IERG 5140** Lightwave Networks
- IERG 5154** Information Theory
- IERG 5200** Channel Coding and Modulation
- IERG 5230** Algorithms and Realization of Internet of Things Systems
- IERG 5240** Applied Cryptography
- IERG 5270** Advanced Topics in P2P Networks and Systems
- IERG 5280** Mobile Networking
- IERG 5290** Network Coding Theory
- IERG 5300** Random Processes for Engineers
- IERG 5310** Security & Privacy in Cyber Systems
- IERG 5320** Digital Forensics
- IERG 5330** Network Economics
- IERG 5340** IT Innovation and Entrepreneurship
- IERG 5350** Reinforcement Learning
- IERG 5590** Advances in Blockchains



# MAJOR ELECTIVES FOR MIEG

- At least 12 units of MIEG Major Electives (Lists A & B), AND
- At least 9 units from List A

A. CSCI2110 (or MATH3250), CSCI3130, 3150, 3230, 3320, 5320 (or MATH3260), ENGG1820, IERG3010/ESTR3300, IERG3050, 3060, IERG3280/ESTR3302, IERG3300/ESTR3304 (or MATH4240), IERG3320/ESTR3306, IERG3810, 3830, 4030, IERG4080/ESTR4312, IERG4090/ESTR4302, IERG4100/ESTR4304, IERG4110/ESTR4314, IERG4130/ESTR4306, IERG4160, IERG4180/ESTR4308, IERG4190, 4210, 4220, 4230, IERG4300/ESTR4300[\*ENGG4030], IERG4330/ESTR4316, IERG4340, IERG4831, 4841, 5020, IERG5040/ENGG5392, IERG5090, IERG5100/ENGG5303, IERG5130, 5140, IERG5154/ENGG5301, IERG5200 (or MATH4260), IERG5230, IERG5240/ENGG5383, IERG5270, 5280, 5290, IERG5300/ENGG5302, IERG5310, 5320, 5330, 5340, 5350, 5590,

B. MATH2060, 2070, 3010, 3030, 3040, 3070, 3080, 3093, 3215, 3230, 3270, 3290, 3310, 3320, 3330, 3360, 4010, 4020, 4030, 4230, 4280



# MAJOR GPA

- ▶ BMEG/CENG/CSCI/EEEN/ELEG/ENER/ENGG/ESTR/FTEC/IERG /MAEG/SEEM required and major elective courses at 2000 and above level as well as IERG2060/ESTR2304 will be included in the calculation of **Major GPA for honour classification**, excluding courses in Faculty Package, Foundation Science courses (except IERG2060/ESTR2304). and Foundation Mathematics courses.



# NEW IE COURSES

## IERG 5350 Reinforcement Learning

This course aims to cover the fundamental topics relevant to Reinforcement Learning (RL), a computational learning approach where an agent tries to maximize the total amount of reward it receives while interacting with the complex and uncertain environments. The course content includes the basics of Markov Decision Processes, model-based and model-free RL techniques, policy optimization, RL distributed system design, as well as the case studies of RL for game playing such as AlphaGo, traffic simulation, and other robotics applications.

Advisory: Students are expected to have solid foundation on signal processing.

## FTEC 4004 E-payment Systems and Cryptocurrency Technologies

The course introduces e-payment systems and cryptocurrency technologies.

Overview and Notion of Money; Banks, Clearing and Settlement; Credit Card Payment Protocols; Smartcard and Stored Value Facilities (SVF) such as Octopus; Digital Wallets and Mobile Payment Protocols and Systems such as Apple Pay, Google Pay, Samsung Pay, AliPay and WeChatPay; Peer-to-Peer Payment Systems such as PayPal; Micropayment and Ecash; Bitcoin and Blockchain Smart Contract, Ethereum and their applications; future of Money Technologies, such Central Bank Digital Currencies (CBDC) .

Pre-requisite: IERG4130/CSCI4130 Introduction to Cyber-Security (not in IE major elective list yet)



# IERG4831

- ▶ - All laboratory work will be done via GNS3, a network emulation platform
- ▶ **Lab01 - Design and implementation of SOHO network**
  - Connects a SOHO network to the Internet via DD-WRT
- ▶ **Lab02 - Design and implementation of switching network**
  - Builds a switching network for a company and connect them to the Internet. VLAN are involved to separate networks from different department
- ▶ **Lab03 - Design and Implementation of Resilience switching network**
  - Builds a large scale switching network for an Enterprise. Static routes are involved.
- ▶ **Lab04 - Design and Implementation of intra-domain routing network**
  - Use the topology in Lab03 to build a network using different kind of routing protocol
- ▶ **Lab05 - Design and implementation of inter-domain routing network**
  - Learn to build an ISP and Internet Exchange (IX)

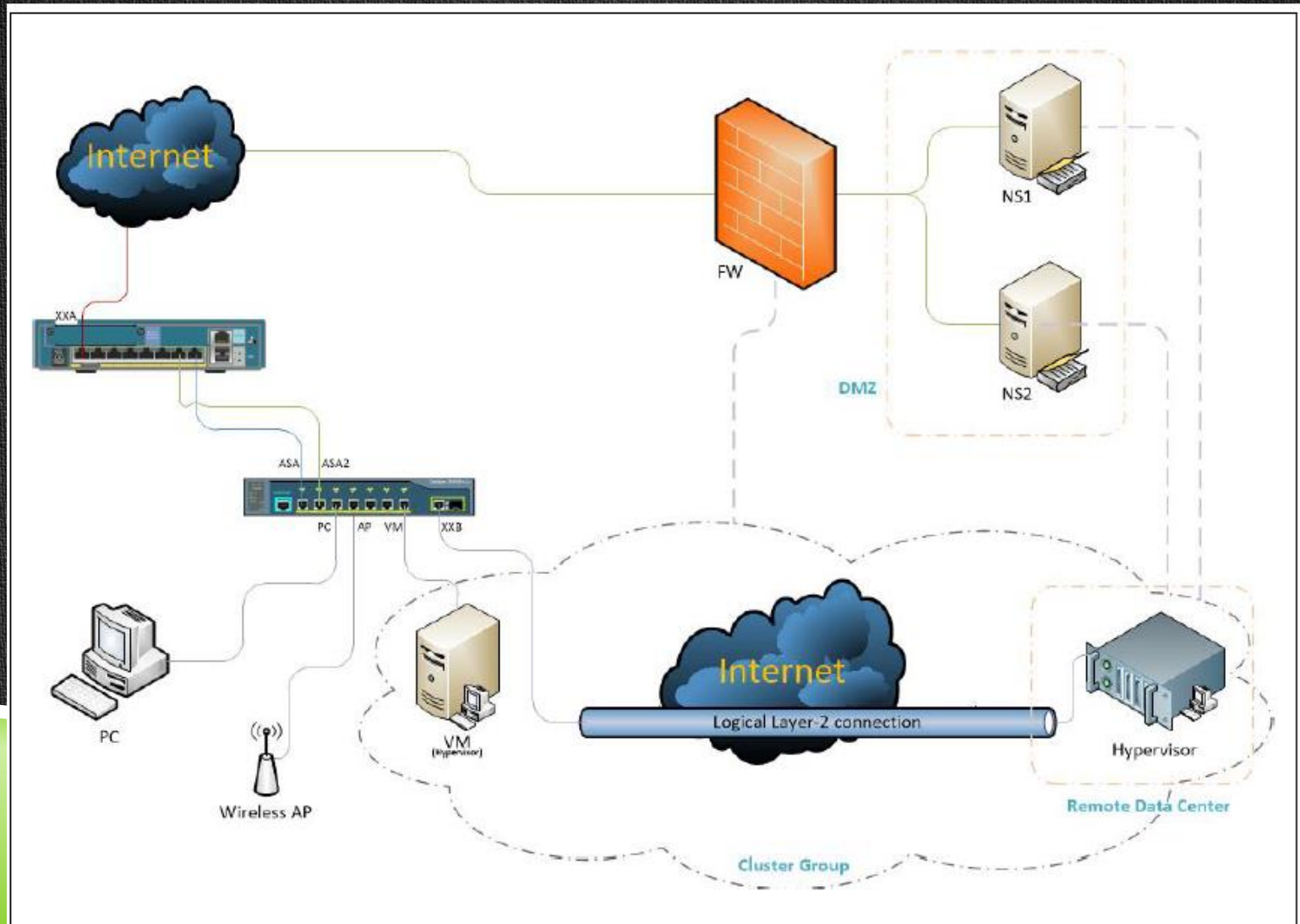


# IERG4841

- ▶ Help the small and medium enterprise (SME) firm to set up an office network and build a private cloud to hold their servers.
- ▶ Configure the switch and firewall device such that the office machine can connect to internet.
- ▶ Servers setup and management:
  - ▶ Setup the management network, which only those authenticated user can access, to manage the VM hypervisors at office and data center.
  - ▶ Provision the firewall VM to protect web and name servers.
  - ▶ Provision the web and name servers.
- ▶ Deploy IPv6 to the servers
- ▶ Deploy wireless AP with WPA, captive portal, & EAP-PEAP authentication

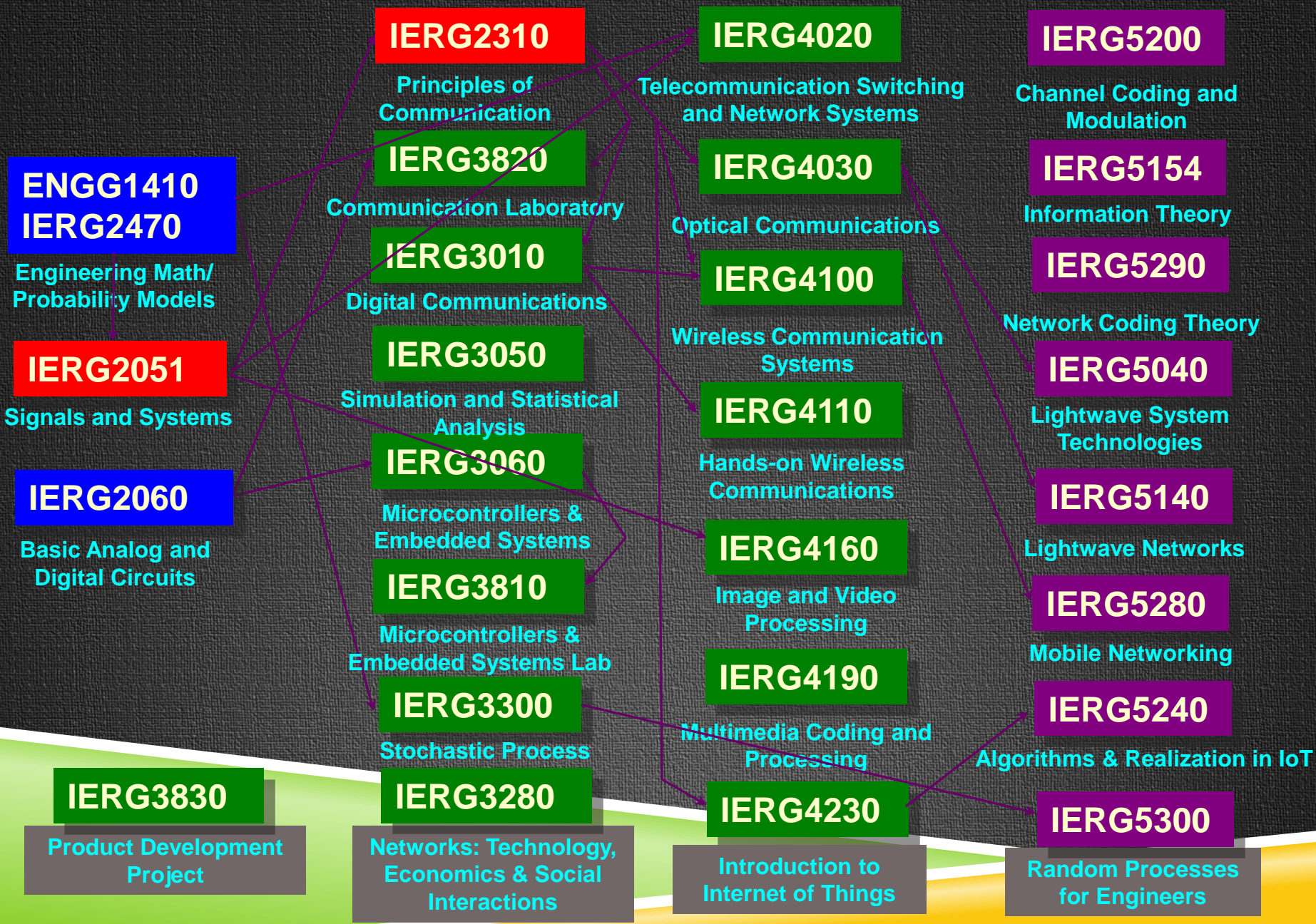


# IERG4841



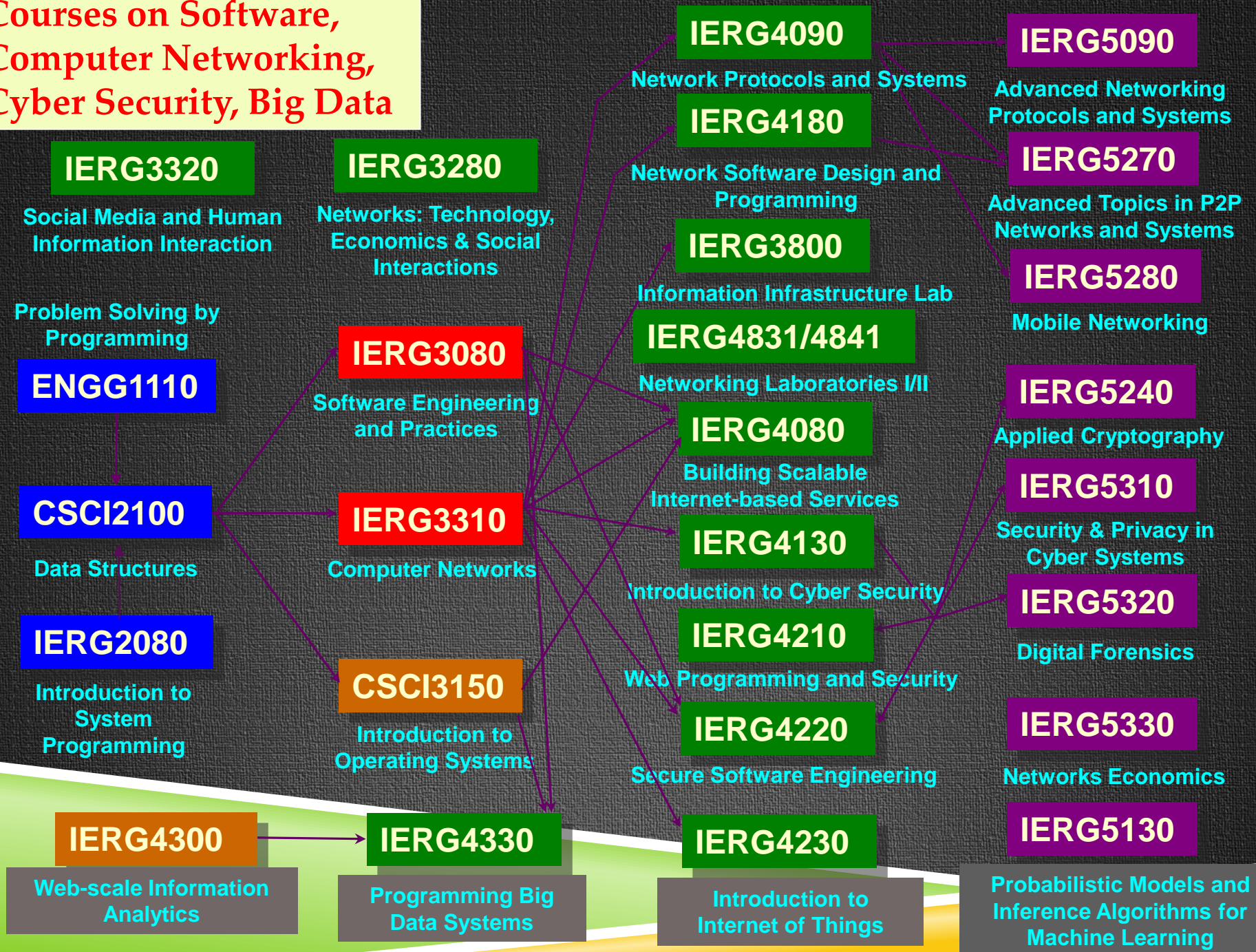


# Courses on Telecommunications and Information Processing





# Courses on Software, Computer Networking, Cyber Security, Big Data





# IE MAJOR **REQUIRED** & **ELECTIVES** TO BE OFFERED IN 2020-21

## First Semester

- IERG3010
- IERG3320
- IERG4030
- IERG4100
- IERG4160
- IERG4220
- IERG4230
- IERG4300
- IERG4831
- IERG4841
- ENGG5301
- ENGG5303
- ENGG5340
- ENGG5383
- IERG5350
- IERG1810
- IERG2051
- IERG2080
- IERG2060
- IERG3080
- IERG3310
- IERG3800

## Second Semester

- IERG3050
- IERG3280
- IERG3830
- IERG4090
- IERG4130
- IERG4180
- IERG4190
- IERG4210
- IERG4330
- IERG4350
- IERG4831
- IERG4841
- IERG5130
- CSCI3150
- FTEC4004
- CSCI2100
- IERG2310
- IERG2470
- IERG2602
- IERG3060
- IERG3310
- IERG3800
- IERG3810
- IERG3820



# IE STREAMS OF SPECIALIZATION

- ▶ **Communications**
  - ▶ **Internet Engineering**
  - ▶ **Cyber Security**
  - ▶ **Enrichment**
  - ▶ **Big Data: Systems and Applications**
- On voluntary basis.
  - To qualify for a stream of specialization, the student must complete **at least 12 units** from the electives listed under the stream.
  - A student who satisfies all the requirements of a stream of specialization may obtain a letter of certification from the department.



# IE STREAMS OF SPECIALIZATION

## Communications

- IERG 3010** Digital Communications
- IERG 3280** Networks: Technology, Economics, and Social Interactions
- IERG 3300** Introduction to Stochastic Processes
- IERG 4030** Optical Communications
- IERG 4100** Wireless Communication Systems
- IERG 4110** Hands-on Wireless Communications
- IERG 4130** Introduction to Cyber Security
- IERG 4230** Introduction to Internet of Things
- IERG 4340** Emerging Technologies in IE
- IERG 5020** Telecommunication Switching and Network Systems
- IERG 5200** Channel Coding and Modulation
- IERG 5230** Algorithms and Realization of Internet of Things Systems
- IERG 5280** Mobile Networking
- IERG 5330** Network Economics
- ENGG 5303** Advanced Wireless Communications
- IERG 5040** Lightwave System Technologies (ENGG5392)



# IE STREAMS OF SPECIALIZATION

## Internet Engineering

<b>CSCI 3150</b>	Introduction to Operating Systems <b>(Required)</b>
<b>IERG 3050</b>	Simulation and Statistical Analysis
<b>IERG 3280</b>	Networks: Technology, Economics, and Social Interactions
<b>IERG 3300</b>	Introduction to Stochastic Processes
<b>IERG 4080</b>	Building Scalable Internet-based Services
<b>IERG 4090</b>	Network Protocols and Systems
<b>IERG 4130</b>	Introduction to Cyber Security
<b>IERG 4180</b>	Network Software Design and Programming
<b>IERG 4190</b>	Multimedia Coding and Processing
<b>IERG 4210</b>	Web Programming and Security
<b>IERG 4831</b>	Networking Laboratory I
<b>IERG 4841</b>	Networking Laboratory II
<b>IERG 5090</b>	Advanced Networking Protocols and Systems
<b>IERG 5280</b>	Mobile Networking



# IE STREAMS OF SPECIALIZATION

## Cyber Security

<b>CSCI 3150</b>	Introduction to Operating Systems
<b>IERG 4130</b>	Introduction to Cyber Security <b>(Required)</b>
<b>IERG 4210</b>	Web Programming and Security
<b>IERG 4220</b>	Secure Software Engineering
<b>IERG 4350</b>	Cloud Computing Security
<b>IERG 5240</b>	Applied Cryptography (ENGG5383)
<b>IERG 5310</b>	Security & Privacy in Cyber Systems
<b>IERG 5320</b>	Digital Forensics
<b>IERG 5590</b>	Advances in Blockchains



# IE STREAMS OF SPECIALIZATION

## Enrichment

<b>IERG 3010</b>	Digital Communications
<b>IERG 3050</b>	Simulation and Statistical Analysis
<b>IERG 3280</b>	Networks: Technology, Economics, and Social Interactions
<b>IERG 3300</b>	Introduction to Stochastic Processes
<b>IERG 4100</b>	Wireless Communication Systems
<b>IERG 4190</b>	Multimedia Coding and Processing
<b>IERG 4300</b>	Web and Information Analytics
<b>IERG 5154</b>	Information Theory (ENGG5301)
<b>IERG 5200</b>	Channel Coding and Modulation
<b>IERG 5290</b>	Network Coding Theory
<b>IERG 5300</b>	Random Processes for Engineers (ENGG5302)
<b>CSCI 3160</b>	Design and Analysis of Algorithms



# IE STREAMS OF SPECIALIZATION

## Big Data: Systems and Applications

<b>IERG 3320</b>	Social Media and Human Information Interaction
<b>IERG 4080</b>	Building Scalable Internet-Based Services
<b>IERG 4160</b>	Image and Video Processing
<b>IERG 4230</b>	Introduction to Internet of Things
<b>IERG 4300</b>	Web-scale Information Analytics <b>(Required)</b>
<b>IERG 4330</b>	Programming Big Data Systems
<b>IERG 5130</b>	Probabilistic Models and Inference Algorithms for Machine Learning
<b>IERG 5350</b>	Reinforcement Learning
<b>CSCI 3320</b>	Fundamental of Machine Learning
<b>CSCI 4180</b>	Introduction to Cloud Computing and Storage
<b>CSCI 4190</b>	Introduction to Social Networks
<b>ELEG 5491</b>	Introduction to Deep Learning



# **ELITE** (ENGINEERING LEADERSHIP, INNOVATION, TECHNOLOGY AND ENTREPRENEURSHIP) STREAM

- ▶ Elective Courses:
- ▶ 15 units of courses:
  - (i) 12 units of ESTR courses of which at most 6 units of courses at 1000 or 2000 level and at least 6 units of courses at 3000 or 4000 level
  - (ii) 3 units of BMEG/CENG/CSCI/ELEG/ENGG/IERG/MAEG/SEEM courses at 5000 level



# CS MINOR

Students are required to complete a minimum of 18 units of courses, with at least 6 units at 3000 or above level, as follows:

	Units
1. Required Courses: CSCI2510, 2520, 2720, 3100	12
2. Elective Courses:	
(a) CSCI1510, 1520, 1530, 1540	3
(b) CENG3150, CENG3430/ESTR3100, CSCI1020, 1030, 1040, 1050, CSCI2110/ENGG2440/ESTR2004, CSCI2120, 2800, 3120, 3130, CSCI3150/ESTR3102, CSCI3160/ESTR3104, CSCI3170, CSCI3180/ ESTR3106, CSCI3190, 3220, CSCI3230/ESTR3108, CSCI3250, 3260, 3280, 3310, 3320, 3420, 4120, 4140, CSCI4180/ESTR4106, CSCI4190, 4210, 4220	3
<b>Total:</b>	<b>18</b>

Explanatory Notes:

- Course(s) in Column A are equivalent to course(s) in Column B and can be used to fulfill the requirements of this Minor Programme.

Column A	Column B
CSCI1110/1120/1130/ESTR1100/1102	CSCI1510/1520/1530/1540
ENGG1110/ESTR1002	CSCI1510/1520/1530/1540
CENG2400/ELEG2401/3230/ ESTR2100	CSCI2510
CSCI2100/ESTR2102	CSCI2520
MATH2210 and 2220	CSCI1530
PHYS2061	CSCI1530

- Other than CSCI2520, 2720 and one of the courses from CSCI1510, 1520, 1530 and 1540, students cannot use the same course to fulfill requirements of both Minor in Computer Science and Minor in Web and Cloud Computing.

IERG3080	CSCI3100
IERG3060	CSCI2510

**\*\*IE students must at least take 3 units CS course to fulfill CS minor.  
(Required by CSE Dept)**





# Q & A

