# ISEM Master's Program Orientation

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# Academic Program Lead

# Welcome to HU and the Information System Engineering and Management (ISEM) Program!

# So…what is "ISEM"?

- "**I**nformation **S**ystems **E**ngineering and **M**anagement"
- A 2-Year, 12-course, 36-credit hour, SEVP-compliant Master's Program (MS in ISEM) aimed at developing technical leaders
- Flexible and interdisciplinary, emphasizing technical, engineering and management business aspects of creating and deploying smart digital enterprises
- Plus an available PhD Program with two (2) study paths
  - Path 1: Traditional PhD or
  - Path 2: (New Fall 2024) Doctor in Engineering (DEng)
- Recent new additions:
  - 3 New Courses (available Fall 2024)
  - 4 "Concentrations"
    - Individualized (student can take any Elective)
    - AI for Business (available Fall 2024)
    - Cloud Computing for Business (available Fall 2024)
    - Blockchain and Cryptocurrency (available Fall 2024)
  - 12 hour non-degree Certificate in "Blockchain and Cryptocurrency" studies
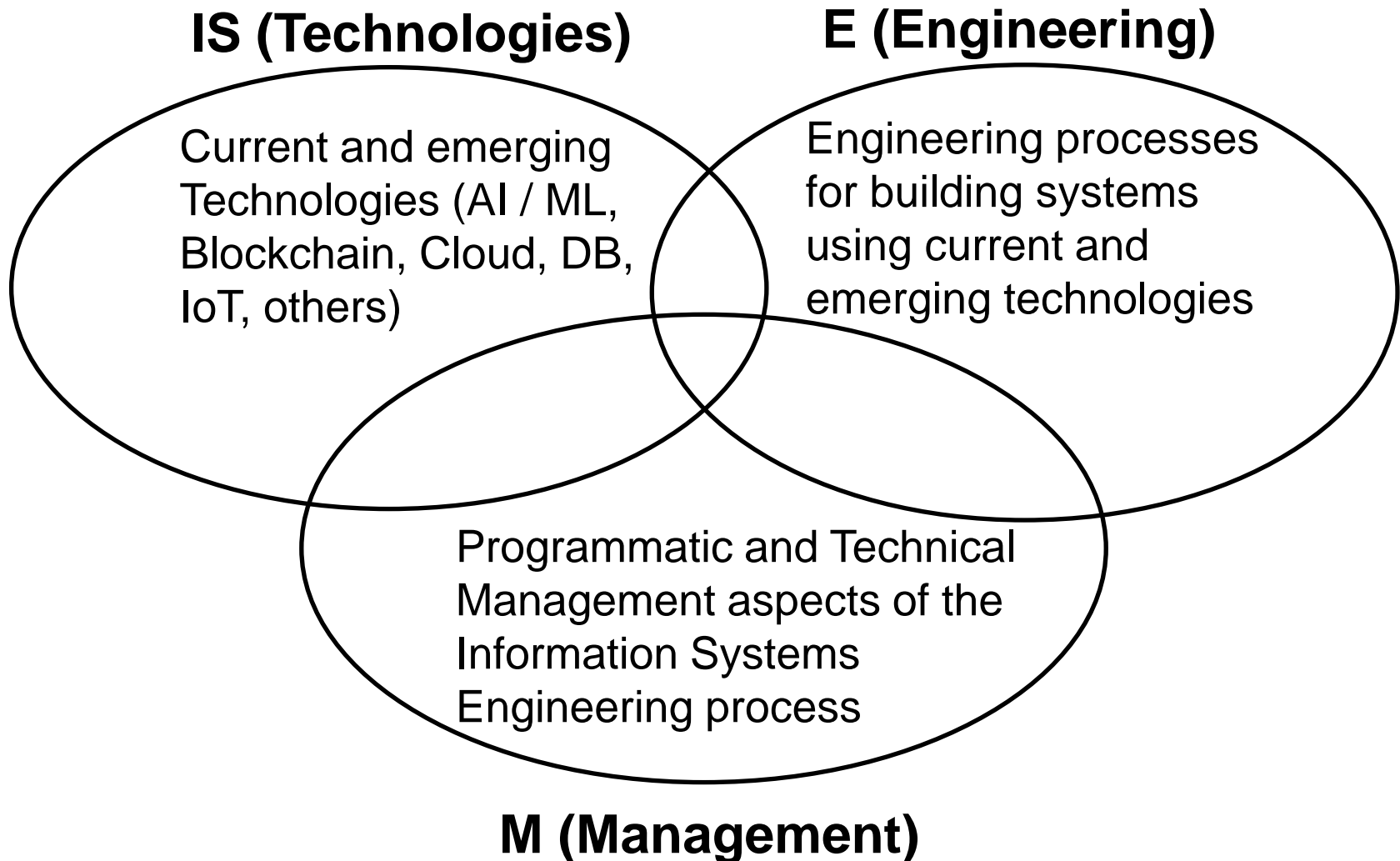
# Overview

ISEM offers the following experience, related to enterprise digital transformation:

- A bridge between current and emerging technologies, including Artificial Intelligence (AI), Machine Learning (ML), Cloud Computing, Blockchain, Management Science, IoT and Industry 4.0

- An understanding of the technical and management aspects of the complex information system development process

- A program designed to educate leaders and managers on how to:

    - Work with Stakeholders

    - Understand business problems

    - Define requirements for addressing Stakeholder problems

    - Then plan, architect, design, integrate, test, deploy and manage the next generation of smart digital enterprises
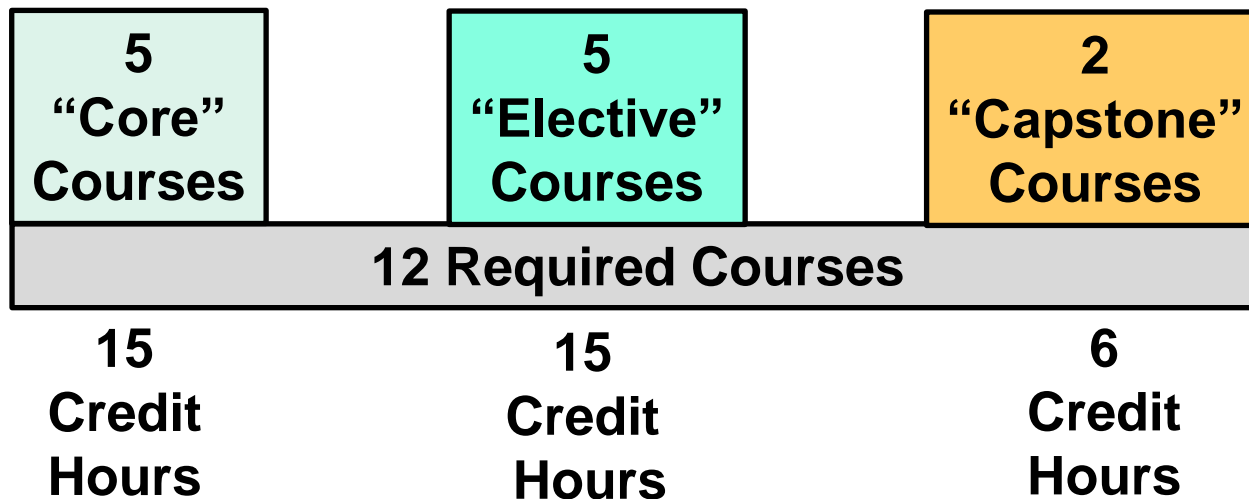
# Three Pillars of the Program

- **Information Systems Technologies**: A primary focus is the study of current and emerging technologies and their applications. Students in ISEM work individually and in teams to gain valuable experience in a range of highly relevant and immediately applicable skills that include: predictive and generative Artificial Intelligence (AI), Machine Learning (ML), Deep Learning, Big Data, Cloud Computing, Blockchains, Business Intelligence, Internet of Things (IoT) and Industry 4.0. Courses evolve to keep up with emerging technologies.

- **Systems Design**: Rather than focus on individual components, students learn to think broadly and gain a range of perspectives and skills, focusing on "systems thinking" and system integration. Significant areas of study include development of enterprise architectures that optimize the use of people, processes, and technologies across a range of environments, industries, and organizational hierarchies.

- **Management**: Students learn to apply the individual skills and unique perspectives they acquire to solve complex problems and apply strategic decision-making across corporations, governments, and other institutions. ISEM Management and Management Science courses focus on business strategies, entrepreneurship, planning integration, security, governance, global enterprises and agile enterprises.

# ISEM Masters Program Perspective

**IS (Technologies)**

**E (Engineering)**

Current and emerging Technologies (AI / ML, Blockchain, Cloud, DB, IoT, others)

Engineering processes for building systems using current and emerging technologies

Programmatic and Technical Management aspects of the Information Systems Engineering process

**M (Management)**

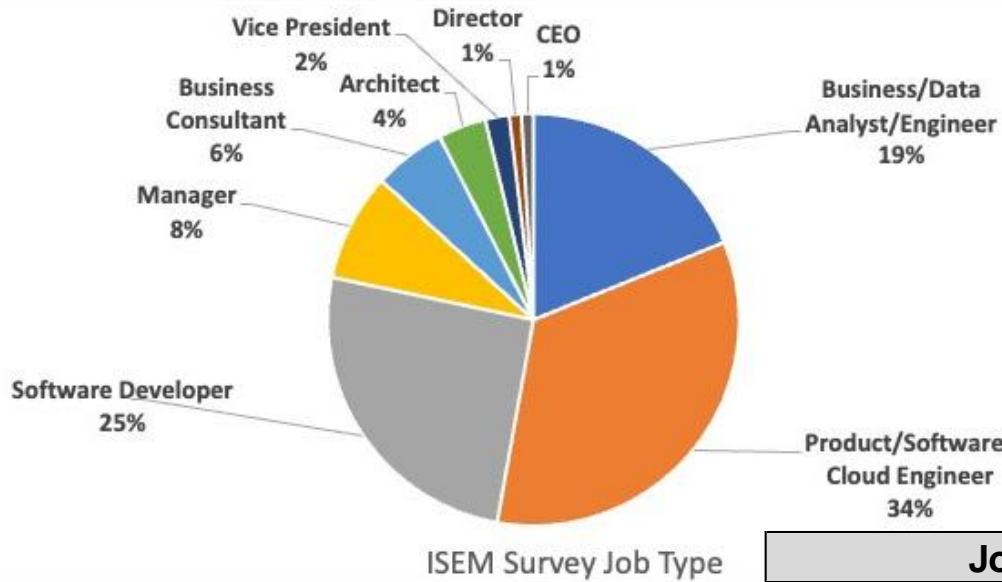# Overview - ISEM Master's Program

- A 36 credit hour program
  - 12 Courses total, 3 Credit Hours per Course
  - Typically 2 courses / semester  (maximum 4 is allowed)
  - Six (6) semesters (at 2 courses / semester)
- Course Requirements:

| 5 "Core" Courses | 5 "Elective" Courses | 2 "Capstone" Courses |
|---|---|---|
| 15 Credit Hours | 15 Credit Hours | 6 Credit Hours |

**12 Required Courses**

# Surveyed ISEM Alumni Jobs (100 total)



ISEM Survey Job Type

ISEM Graduates are found working in high demand roles at many top organizations.

| Job Type | Count | % of Total |
|---|---|---|
| Business/Data Analyst/Engineer | 20 | 19% |
| Product/Software/Cloud Engineer | 36 | 34% |
| Software Developer | 27 | 25% |
| Manager | 9 | 8% |
| Business Consultant | 6 | 6% |
| Architect | 4 | 4% |
| Vice President | 2 | 2% |
| Director | 1 | 1% |
| CEO | 1 | 1% |
| *Total:* | *106* | *100%* |

# Job / Salary Aspiration

Based on a recent Survey:

| Occupation | Avg Salary |
|---|---|
| CEO | 246,440 |
| Computer and information Systems Managers | 122,860 |
| Computer and Information Research Scientist | 155,880 |
| Computer Systems Analyst | 107,530 |
| Computer and information Analyst | 110,550 |
| Information security Analyst | 119,860 |
| Network Architect | 129,490 |
| Database Architects | 102,530 |
| Software Developers | 132,930 |
| Computer Programmers | 102,790 |
| Software Q&A | 105,750 |
| Data Scientist | 115,240 |

# ISEM Course Path ("1 Year Core, 1 Year Electives")

**Note: <u>All</u> ISEM students entering Program select upon Admission an incoming <u>Concentration</u> from list of five (5). This can be changed only within student's first 24 credit hours by a student-initiated "Program Change Form".**

| Yr. | Sem. | Semester Course 1 | Semester Course 2 | Hrs. |
|---|---|---|---|---|
| 1 | 1 | **(Core) ISEM 500** | **(Core) MGMT 510** | 6 |
| | 2 | **(Core) ISEM 540** | **(Core) ISEM 530 course** | 6 |
| | 3 | **Pick 1 "Core" course from list: ISEM 502, ISEM 534, ISEM 551, ISEM 570, MGMT 511** | | 3 |
| | | **Core" courses now complete. Proceed to selected "Concentration" Courses.** | | |
| | | **"Non-Individualized" Concentration: Pick "Concentration Course 1" from list: ISEM 503, ISEM 547, ISEM 574** | **"Individualized" Concentration: Pick 1 Elective courses** (Elective 1 of 5) | 3 |
| 2 | 4 | **"Individualized" Path:** Elective 2 of 5 <br> **"Non-Individualized ":** Concentration Course 2 | **"Individualized" Path**: Elective 3 of 5 <br> **"Non-Individualized":** Concentration Course 3 | 6 |
| | 5 | **"Individualized" Path:** Elective 4 of 5 <br> **"Non-Individualized":** Concentration Course 4 | **(Capstone)** GRAD 695 <br> (in accordance with Concentration) | 6 |
| | 6 | **"Individualized" Path**: Elective 5 of 5 <br> **"Non-Individualized":** Concentration Course 5 | **(Capstone)** ISEM / GRAD 699 <br> (in accordance with Concentration) | 6 |
| | **Key:** | **Core Courses**   **Concentration Course** | **Total:** | 36 |

# ISEM Graduate Courses

- ISEM has a large catalog of available courses
- <u>Primary goal:</u> Educate students on how to be technical leaders in their organization, with a comprehensive understanding of technologies, processes and various aspects of management
- Most authoritative source of course offerings is the "Graduate Course Catalog", found at the following URL:

Harrisburg University of Science and Technology - Acalog ACMS™

Note: The Graduate Course  Catalog is updated every Spring. Take care that you are viewing the latest Catalog.

# Concentrations

- Upon entering ISEM, <u>each</u> student selects a Concentration. The default Concentration is the Individualized" Concentration.
- A student remains in a selected Concentration unless a program change form is executed before 24 credit hours have been taken. A change in Concentration cannot extend the length of a student's Master's studies.
- A student must commit to taking courses <u>and</u> executing a Capstone Project in their selected Concentration topic area.

# PROGRAM CONCENTRATIONS

Upon entry to ISEM program, each student picks one of available "Concentrations". A student will remain in that chosen Concentration unless they switch to a different Concentration before 24 Credit Hours have been accomplished. ISEM Concentrations are:

| No. | Concentration | Core | Electives | Capstone (2 semesters) | ISEM Faculty Advisors |
|-----|---------------|------|-----------|------------------------|-----------------------|
| | | | **Course Structure** | | |
| 1 | Artificial Intelligence (AI) for Business | 5 | 3 Concentration + 2 Elective Courses | In AI Field of Study | Dr. Siamak Aram |
| 2 | Cloud Computing for Business | 5 | 3 Concentration + 2 Elective Courses | In Cloud Computing Field of Study | Dr. Siamak Aram |
| 3 | Blockchain and Cryptocurrency | 5 | 3 Concentration + 2 Elective Courses | In Blockchain Field of Study | Prof. Tom Plunkett |
| 4 | Individualized | 5 | Any 5 HU Graduate Electives | In ISEM-related Field of Study | Dr. Robert Pittman |

# A Word About Concentration Course Sequences

Concentration Course sequences across semesters can vary depending on the following factors. <u>Your faculty advisor can navigate you through these impacts</u>:

- If you take ISEM 501, it will slightly modify the sequence of subsequent courses

- All Core Courses are taught in both "Regular" and "Late" semesters. However, you may see a slightly different order in semester 3 and semester 4 Concentration courses, dependent on whether you are proceeding through ISEM in a "Regular" or "Late" course sequence.

# "Individualized" Concentration Course Sequence (available now)

| | | Semester Course 1 | Semester Course 2 | Hrs. |
|---|---|---|---|---|
| Note | | **Note: All ISEM students entering Program select upon Admission an incoming Concentration from a list of five (5). This can be changed only within they student's first 24 credit hours by a student-initiated "Program Change Form".** | | |
| **Yr.** | **Sem.** | **Semester Course 1** | **Semester Course 2** | **Hrs.** |
| **1** | **1** | **(Core) ISEM 500** | **(Core) MGMT 510** | 6 |
| | **2** | **(Core) ISEM 540** | **(Core) ISEM 530 course** | 6 |
| | **3** | **Semester 3: Pick 1 "Core" course from list: ISEM 502, ISEM 534, ISEM 551, ISEM 570, MGMT 511** | | 3 |
| | | **Semester 3: "Individualized" Path.** (Elective 1 of 5) | | 3 |
| **2** | **4** | **"Individualized" Path:** Elective 2 of 5 | **"Individualized" Path**: Elective 3 of 5 | 6 |
| | **5** | **"Individualized" Path:** Elective 4 of 5 | **(Capstone) GRAD 695** | 6 |
| | **6** | **"Individualized" Path**: Elective 5 of 5 | **(Capstone) ISEM / GRAD 699** | 6 |
| | **Key:** | **Core Courses**        **Concentration Coursed** | **Total:** | 36 |

Upon completion of "Core" courses in Semester 3, student can then take any five (5) applicable University graduate courses. This is the most flexible Concentration.

Note that if the student starts with ISEM 501 in Semester 1, you will have a slightly different course sequence. Your faculty advisor will explain.

# "AI for Business" Concentration Course Sequence (available Fall 2024)

| | | | | |
|---|---|---|---|---|
| **Note: <u>All</u> ISEM students entering Program select upon Admission an incoming <u>Concentration</u> from a list of five (5). This can be changed only within they student's first 24 credit hours by a student-initiated "Program Change Form".** | | | | |

| Yr. | Sem. | Semester Course 1 | Semester Course 2 | Hrs. |
|---|---|---|---|---|
| **1** | **1** | **(Core) ISEM 500** | **(Core) MGMT 510** | 6 |
| | **2** | **(Core) ISEM 540** | **(Core) ISEM 530 course** | 6 |
| | **3** | **Semester 3: Pick 1 "Core" course from list: ISEM 502, ISEM 534, ISEM 551, ISEM 570, MGMT 511** | | 3 |
| | | **Semester 3: ISEM 503** (Concentration Course 1 of 5) | | 3 |
| **2** | **4** | **ISEM 564** (Concentration Course 2 of 5) | **GRAD Elective** (suggest **ISEM 582** if available) (Concentration Course 3 of 5) | 6 |
| | **5** | **ISEM 505** (Concentration Course 4 of 5) | **(Capstone) GRAD 695** (in accordance with Concentration) | 6 |
| | **6** | **GRAD Elective)** (suggest **ISEM 565** if available) (Concentration Course 5 of 5) | **(Capstone) ISEM / GRAD 699** (in accordance with Concentration) | 6 |
| | **Key:** | **Core Courses**    **Concentration Coursed** | **Total:** | **36** |

Upon completion of "Core" courses in Semester 3, student takes a focused set of AI-related courses. Student will earn both a diploma <u>and</u> a Certificate in this Concentration upon completion of all  courses and execution of their Capstone in a related topic.

<u>Note</u>: Concentration Course sequence in semesters 4 and 5 may be slightly modified depending on whether you took ISEM 501 in Semester 1 or are proceeding through ISEM in the "Regular" or "Late" semester Course sequence. Your faculty advisor will explain.

# "Blockchain and Cryptocurrency" Concentration Course Sequence
## (available Late Fall 2024)

| | | | | | |
|---|---|---|---|---|---|
| note | **Note:** **All** ISEM students entering Program select upon Admission an incoming <u>Concentration</u> from a list of five (5). This can be changed only within they student's first 24 credit hours by a student-initiated "Program Change Form". | | | | |
| **Yr.** | **Sem.** | **Semester Course 1** | | **Semester Course 2** | **Hrs.** |
| **1** | **1** | **(Core) ISEM 500** | | **(Core) MGMT 510** | 6 |
| | **2** | **(Core) ISEM 540** | | **(Core) ISEM 530 course** | 6 |
| | **3** | **Semester 3: Pick 1 "Core" course from list: ISEM 502, ISEM 534, ISEM 551, ISEM 570, MGMT 511** | | | 3 |
| | | **Semester 3: ISEM 578** (Concentration Course 1 of 5) | | | 3 |
| **2** | **4** | **ISEM 576** (Concentration Course 2 of 5) | | **GRAD Elective** (Concentration Course 3 of 5) | 6 |
| | **5** | **ISEM 574** (Concentration Course 4 of 5) | | **(Capstone) GRAD 695** (in accordance with Concentration) | 6 |
| | **6** | **GRAD Elective** (Concentration Course 5 of 5) | | **(Capstone) ISEM / GRAD 699** (in accordance with Concentration) | 6 |
| | **Key:** | Core Courses | Concentration Courses | **Total:** | **36** |

Upon completion of "Core" courses in Semester 3, student takes a focused set of Blockchain and Cryptocurrency-related courses. Student will earn both a diploma <u>and</u> a Certificate in this Concentration upon completion of all courses and execution of their Capstone in a related topic.

<u>Note</u>: Concentration Course sequence in semesters 4 and 5 may be slightly modified depending on whether you took ISEM 501 in Semester 1 or are proceeding through ISEM in the "Regular" or "Late" semester Course sequence. Your faculty advisor will explain.

# "Cloud Computing for Business" Concentration Course Sequence
## (available Fall 2024)

| Note: **All** ISEM students entering Program select upon Admission an incoming <u>Concentration</u> from a list of five (5). This can be changed only within they student's first 24 credit hours by a student-initiated "Program Change Form". | | | |
|---|---|---|---|
| **Yr.** | **Sem.** | **Semester Course 1** | **Semester Course 2** | **Hrs.** |
| **1** | **1** | **(Core) ISEM 500** | **(Core) MGMT 510** | 6 |
| | **2** | **(Core) ISEM 540** | **(Core) ISEM 530 course** | 6 |
| | **3** | **Semester 3: Pick 1 "Core" course from list: ISEM 502, ISEM 534, ISEM 551, ISEM 570, MGMT 511** | | 3 |
| | | **Semester 3: ISEM 536** (Concentration Course 1 of 5) | | 3 |
| **2** | **4** | **ISEM 564** (Concentration Course 2 of 5) | **GRAD Elective** (sugges**t** **ISEM 503** if available) (Concentration Course 3 of 5) | 6 |
| | **5** | **ISEM 582** (Concentration Course 4 of 5) | **(Capstone) GRAD 695** (in accordance with Concentration) | 6 |
| | **6** | **GRAD Elective** (suggest **ISEM 533** if available) (Concentration Course 5 of 5) | **(Capstone) ISEM / GRAD 699** (in accordance with Concentration) | 6 |
| | **Key:** | Core Courses      Concentration Courses | **Total:** | 36 |

Upon completion of "Core" courses in Semester 3, student takes a focused set of database-related courses. Student will earn both a diploma <u>and</u> a Certificate in this Concentration upon completion of all courses and execution of their Capstone in a related topic.

<u>Note</u>: Concentration Course sequence in semesters 4 and 5 may be slightly modified depending on whether you took ISEM 501 in Semester 1 or are proceeding through ISEM in the "Regular" or "Late" semester Course sequence. Your faculty advisor will explain.

# Certificate in Blockchain and Cryptocurrency

- 12-semester hour Certificate Program

- Available as a non-degree option

- Four (4) Courses:
  - ISEM 574 – Bitcoin Blockchain
  - ISEM 575 – Ethereum Blockchain
  - ISEM 576 – Cryptocurrency and Regulation
  - ISEM 578 – Decentralized Finance

- Yields a digital credential upon completion

# Affiliated ISEM Relationships

Looking ahead: ISEM is actively engaged in developing the following affiliated relationships:

- HU "4+1" streamlined "BS-to-MS" 5-year path to an ISEM Master's degree

- "Bachelors-to-PhD" Pathway
  - For students entering HU with a BS degree and intent on achieving a PhD degree

# ISEM PhD Program

# ISEM PhD Program – Two Paths

Upon entry to the ISEM PhD Program, students can direct their PhD Experience in one of two (2) directions:

1. "PhD" – traditional research oriented

2. (Available Fall 2024) "Doctor of Engineering (DEng)"
   – Focused on solving a specific, complex
      applied problem.

# Doctor of Philosophy (PhD) in ISEM

- Traditional research-oriented Doctorate of Philosophy

- Intended for those interested in a career in academia or industry research leadership positions, with a potential pathway to CTO/CEO roles

**Requirements**

- Complete BREADTH Courses (9 TO 21 SEMESTER HOURS (SH))

- Complete DEPTH Courses (9 SH)
  - MILESTONE 1: Complete the Qualifying Exam (QE)

- Complete the Doctoral Research Seminar (6 SH)
  - MILESTONE 2: Successful Defense of Dissertation Proposal

- Complete the Dissertation with novel research (18 – 36 SH)
  - MILESTONE 3: Successful Defense of Dissertation

# Doctor of Engineering (DEng) in ISEM

- Solution-focused research for an approved complex applied problem

- Intended for those primarily interested in a career in industry research leadership positions with a potential pathway to CTO/CEO roles

**Requirements**

- MILESTONE 1: Proposal to research and solve a complex problem

- Complete BREADTH Courses (9 - 12 SH)

- Complete DEPTH Courses (9 – 12 SH)

- Complete the Doctoral Research Seminar (6 – 12 SH)

  - MILESTONE 2: Successful Defense of Dissertation Proposal

- Complete Dissertation by successfully researching and solving the identified problem (12 – 18 SH)

  - MILESTONE 3: Successful Defense of Dissertation

# How to Prepare for the ISEM <u>PhD</u> Program while in the ISEM  Master's Program

- Note that Participation in ISEM Masters Program is <u>not</u> an automatic entry point into the ISEM PhD Program.

- Competitive - student must do <u>very well</u> in Master's Program studies

- Selective - student must apply and agree to be interviewed.

- To best prepare:

  - Complete and do very well in all ISEM "Core" Courses

  - 2-semester Capstone project should be in your anticipated area of Doctoral study. You can discuss this with your ISEM Advisor.

  - Successfully take these courses ISEM Master's candidate:

    - ISEM 530 Systems Engineering Principles

    - ISEM 503 Artificial Intelligence

    - GRAD 509 Research Methods

    - Capstone (GRAD 695 + GRAD 699) in proposed study area

# Thank you!

For additional ISEM Master's Program Information or for answers to specific questions, please:

- Consult the HU ISEM Web Link
- Review the current version of "Graduate Catalog: Master and Doctorate Degrees"
- Students can talk to individual ISEM course instructors or assigned Advisor
- If you still need assistance, contact the ISEM Academic Program lead via <u>e-mail</u>:

Dr. Robert Pittman
RPittman@Harrisburgu.edu