

# Carnegie Mellon University

## Master of Information Technology Strategy

### Plans of Study (POS) and Graduation Requirements *for students beginning Fall 2022 or later*

#### **Option 1: MITS Standard Program (12-months, 126 units total)**

Students must complete:

- 48 units total of core courses, 12 units from each of the concentration tracks:
  - Data Analytics
  - Politics and Strategy
  - Information Security
  - Software and Network Systems
- 24 units (minimum) of concentration courses
- 6 units of IPS Policy Seminar
- 36 units of MITS project
- 12 units (minimum) of elective coursework, which must be approved and in MITS genre

*Please note:*

- All core and concentration courses must be completed by the end of the spring semester.
- Core courses can be used for concentration course requirements unless otherwise noted.

Students must complete all of the Option 1 requirements, minus the summer internship. Students will instead complete their project during the summer semester and graduate at the end of summer.

#### **Recommended Coursework Plan by Semester (MITS Standard Program)**

| <b>Fall</b>                                                           | <b>Spring</b>                                       | <b>Summer</b>                                  |
|-----------------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------|
| Information Security Core Course (12 units)                           | Software & Networked Systems Core Course (12 units) | MITS Project (36 units)                        |
| Data Analytics Core Course (12 units)                                 | Concentration Course (12 units)                     |                                                |
| Politics and Strategy Core Course (12 units)                          | Concentration Course (12 units)                     |                                                |
| MITS Seminar (3 Units)                                                | Approved Elective (12 units)                        |                                                |
| Intro to Computer Systems elective or Concentration Course (12 units) | <i>Optional</i> Approved Elective (12 units)        | <i>Optional</i> Approved Elective (6-12 units) |
|                                                                       | MITS Seminar (3 units)                              |                                                |

**Option 2: MITS Applied Study (16 months, 129 units total)**

Students must complete:

- 48 units total of core courses, 12 units from each of the concentration tracks:
  - Data Analytics
  - Politics and Strategy
  - Information Security
  - Software and Network Systems
- 24 units (minimum) of concentration courses
- 6 units of IPS Policy Seminar
- 36 units of MITS project
- 12 units (minimum) of elective coursework, which must be approved and in MITS genre
- 3 units of internship in the summer semester

Please note:

- All core and concentration courses must be completed by the end of the spring semester.
- Core courses can be used for concentration course requirements unless otherwise noted.

**Recommended Coursework Plan by Semester (MITS Applied Study)**

| Fall                                                    | Spring                                              | Summer                        | Fall                                           |
|---------------------------------------------------------|-----------------------------------------------------|-------------------------------|------------------------------------------------|
| Information Security Core Course (12 units)             | Software & Networked Systems Core Course (12 units) | Required Internship (3 units) | MITS Project (36 units)                        |
| Data Analytics Core Course (12 units)                   | Concentration Course (12 units)                     |                               |                                                |
| Politics & Strategy Core Course (12 units)              | Concentration Course (12 units)                     |                               |                                                |
| 15513/11637 elective or Concentration Course (12 units) | Approved Elective (12 units)                        |                               |                                                |
| MITS Seminar (3 Units)                                  | MITS Seminar (3 units)                              |                               | <i>Optional</i> Approved Elective (6-12 units) |

## **Core Courses**

Core courses establish the necessary background and a common competence level in each of the four thematic areas. Students must take at least one core course option from **each** of the Concentration areas below, for a total of 48 units minimum.

### **Data Analytics**

- Option 1: 05-834/11-663 Applied Machine Learning (fall/spring)
  - *Note: Students in the Data Analytics Concentration may not take 05-834; Students may not take both 05-834 and 10-601/701.*
- Option 2: 17-685/17-801 Dynamic Network Analysis (spring)
- Option 3: 10-601/10-701 Introduction to Machine Learning (fall/spring)
  - 11-637 (summer/fall) OR 10-606 AND 10-607 recommended prior or concurrent but not required (summer/fall 1<sup>st</sup> and 2<sup>nd</sup> half minis)

### **Politics and Strategy**

- Option 1: 84-605 The Future of Warfare (fall)
- Option 2: 84-687 Technology and Policy of Cyber War (spring)

### **Information Security**

- Option 1: 17-631 Information Security, Privacy, and Policy (fall)
  - Option 2: 18-631/14-741 Introduction to Information Security (fall/spring)
  - Option 3: 18-730 Introduction to Computer Security (fall)
- (Note: Students may not take any of the above options as concentration or elective courses)*

### **Software and Networked Systems**

- Option 1: 15-640 Distributed Systems (fall/spring, prerequisite 15-513)
- Option 2: 15-641 Networking and the Internet (fall, prerequisite 15-513)
- Option 3: 18-741 Computer Networks (spring)
- Option 4: 17-635 Software Architecture AND 17-632 Software Project Mgmt (spring 1<sup>st</sup> half minis)
- Option 5: 17-636 Applied Distributed Systems (fall & spring 1<sup>st</sup> half mini/summer)  
AND
  - 17-646 DevOps and Continuous Integration (fall & spring 2<sup>nd</sup> half mini/summer)OR
  - 17-647 Data Intensive and Scalable Systems (spring 2<sup>nd</sup> half mini)

*(Note: Students in the Software and Network Concentration may not use Options 4 or 5 for their core requirement. The courses may be used toward concentration requirements.)*

## **Concentration Courses**

### **Data Analytics (DA)**

- 10-605 Machine Learning Large Data Sets (fall/spring)
- 10-606 Mathematical Foundations for Machine Learning (fall 1<sup>st</sup> half mini/summer 1<sup>st</sup> half mini)
- 10-607 Computational Foundations for Machine Learning (fall 2<sup>nd</sup> half mini/summer 2<sup>nd</sup> half mini)
- 10-703 Deep Reinforcement Learning and Control (fall)
- 10-707 Topics in Deep Learning (spring)
- 10-708 Probabilistic Graphics Models (fall/spring)
- 10-613/10-713 Machine Learning Ethics and Society (fall, prereq 10-601 or 10-701)
- 10-714 Deep Learning Systems: Algorithms & Implementation (fall, prereq 15-513 AND 10-601/701)
- 10-718 Machine Learning in Practice (fall/spring)
- 11-611/711 Natural Language Processing (fall/spring)
- 11-641 Machine Learning for Text Mining (fall/spring)
- 11-642 Search Engines (fall/spring)
- 11-731 Machine Translation and Sequence-to-Sequence Models (fall)
- 11-747 Neural Networks for NLP (spring)
- 11-777 Multimodal Machine Learning (fall/spring, prereq 10-601 or 10-701)
- 11-785 Introduction to Deep Learning (fall/spring)
- 15-688 Practical Data Science (spring)
- 15-780 Graduate Artificial Intelligence (spring)
- 16-824 Visual Learning and Recognition (fall/spring)
- 17-634 Applied Machine Learning (spring 1<sup>st</sup> half mini)
- 17-644 Applied Deep Learning (spring 2<sup>nd</sup> half mini)

### **Politics and Strategy (PS)**

- 84-600 Security War Game (spring 2<sup>nd</sup> half mini)
- 84-622 Nonviolent Conflict and Revolution (spring)
- 84-625 Contemporary American Foreign Policy (spring)
- 84-624 Future of Democracy (spring)
- 84-665 The Politics of Fake News and Misinformation (spring)
- 84-662 Diplomacy and Statecraft (fall)
- 84-669 Decision Science for International Relations (fall)
- 84-672 Space and National Security (spring)
- 84-673 Emerging Technologies and the Law (spring)
- 84-680 US Grand Strategy (fall)
- 84-682 Conflicts in the Middle East: Iran, Iraq, and Proxy Warfare (fall)
- 84-686 The Privatization of Force (fall)
- 84-688 Concepts of War and Cyber War (fall 2<sup>nd</sup> half mini)
- 84-689 Terrorism and Insurgency (fall/spring)
- 84-690 Social Media, Technology, and Conflict (spring)
- 84-720 International Security Graduate Seminar (spring)
- 84-722 Comparative Political Institutions Graduate Seminar (fall)
- 16-735 Ethics and Robotics (spring)
- 17-652 Innovation and Entrepreneurship in Technology (summer 2<sup>nd</sup> half mini)
- 17-684 Ethics and Policy Issues in Computing (fall/spring)
- 19-701 Intro to the Theory & Practice of Policy (fall)
- 19-711 Science and Innovation Leadership for the 21st Century: Firms, Nations, and Tech (fall)
- 19-713 Policies of Wireless Systems (fall)
- 19-722 Telecommunications Technology and Policy for the Internet Age (spring)

### **Information Security (IS)**

- 05-836 Usable Privacy and Security (spring)
- 14-735 Secure coding (fall)
- 14-761 Applied Information Assurance (fall/spring)
- 14-814/18-637 Wireless Security (spring, prerequisites 18-631/14-741 or 18-730 AND 18-741 or 15-641)
- 14-817 Cyber Risk Modeling (spring)
- 14-819 Introduction to Software Reverse-Engineering (spring, prerequisite 15-513)
- 14-822 Host Based Forensics (spring, co-requisite 14-761)
- 14-823 Network Forensics (fall)
- 18-731 Network Security (spring, prerequisite 18-631/14-741 or 18-730)
- 18-732 Secure Software Systems (spring, prerequisite 18-631/14-741 or 18-730)
- 18-733 Applied Cryptography (spring, prerequisite 18-631/14-741 or 18-730)
- 18-734 Foundation of Privacy (fall)
- 95-810 Blockchain Fundamentals (fall 2<sup>nd</sup> half mini/summer)
- 95-855 Network Traffic Analysis (fall 2<sup>nd</sup> half mini/summer 2<sup>nd</sup> half mini)
- 95-884 Network Defenses (fall 1<sup>st</sup> half mini/summer 1<sup>st</sup> half mini)

### **Software and Networked Systems (SNS)**

- 11-642 Search Engines (fall/spring)
- 14-740 Fundamentals of Telecommunication Networks (fall/spring)
- 14-848 Cloud Infrastructure: Design, Analysis and Implementation (fall)
- 15-618 Parallel Computer Architecture and Programming (fall/spring)
- 15-619/15-719/18-709 Cloud Computing (fall/spring)/Advanced Cloud Computing (spring)
- 15-746 Storage Systems (fall, prerequisite 15-513)
- 16-720 Computer Vision (fall/spring)
- 16-722 Sensing and Sensors (fall)
- 16-761 Mobile Robots (spring)
- 16-782 Planning and Decision-making in Robotics (fall)
- 17-611 Statistics for Decision Making (fall 1<sup>st</sup> half mini/summer 1<sup>st</sup> half mini)  
AND 17-626 Requirements for Information Systems (fall 2<sup>nd</sup> half mini)  
OR 17-627 Requirements for Embedded Systems (fall 2<sup>nd</sup> half mini)
- 17-614 Formal Methods (fall 1<sup>st</sup> half mini)  
AND 17-622 Agile Methods (fall 2<sup>nd</sup> half mini)  
OR 17-624 Advanced Formal Methods (fall 2<sup>nd</sup> half mini)
- 17-616 DevOps: Engineering for Deployment and Operations (fall)
- 17-623 Quality Assurance (fall 2<sup>nd</sup> half mini) AND 17-643 Quality Management (spring 2<sup>nd</sup> half mini)
- 17-637 Web Application Development (fall/spring)
- 17-642 Software Management Theory (spring 2<sup>nd</sup> half mini)
- 17-645/17-745/11-695 Machine Learning in Production/AI Engineering (fall/spring)
- 17-648 Sensor Based Systems (spring 2<sup>nd</sup> half mini, prerequisite 17-636)
- 17-652 Innovation and Entrepreneurship in Technology (summer 2<sup>nd</sup> half mini)
- 17-681 Java for Application Programmers (fall 1<sup>st</sup> half mini/spring 1<sup>st</sup> half mini)  
AND 17-683 Data Structures for Application Programmers (fall 2<sup>nd</sup> half mini/spring 2<sup>nd</sup> half mini)
- 18-642 Embedded System Software Engineering (fall, prerequisite 15-513)
- 18-648 Embedded Real Time Systems (fall, prerequisite 15-513)
- 18-756 Packet Switching & Computer Networks (fall)
- 18-843 Mobile and Pervasive Computing (fall/spring, prerequisite 15-513)