Viewing: **EN-CHE-MS : M.S. in Chemical Engineering**

Last approved: 09/21/20 5:50 pm

Last edit: 08/05/20 9:54 am

History

1. Sep 21, 2020 by Edward Dreyzin (dreyzin)

Catalog Pages Using this Program

[M.S. in Chemical Engineering](#)

Department(s) / College(s)

Department	College
Chemical and Materials Engr (CME)	Newark College of Engineering (EN)

Name of Program   M.S. in Chemical Engineering

Academic Level(s)
   Graduate

Degree Designation   MS

Campus(es) where the program will be offered
   Newark

CIP Code

Effective Catalog Edition

Related Department(s)

If the change involves altering the department's curriculum paradigm as currently outlined in the NJIT catalog, please attach existing and proposed paradigms.

Articulation with
other institutions, if
any

Objectives

Briefly summarize the program and indicate its objectives; e.g., the nature and focus of the program, the knowledge and skills students will acquire, any cooperative arrangements with other institutions or external agencies in offering this program, etc.

Need

Provide justification of the need for this program. If the program falls within the liberal arts and sciences and does not specifically prepare students for a career, then provide evidence of student demand and indicate opportunities for students to pursue advanced study (if the degree is not terminal with regard to further education). If the program is career-oriented or professional in nature, then in addition to student demand give evidence of labor market need and results of prospective employer surveys. Report labor market need as appropriate on local, regional, and national bases. Specify job titles and entry-level positions for program graduates, and/or indicate opportunities for graduates to pursue additional studies.

Relationship to the University and State Master Plans

Describe the relationship of the program to the following: institutional master plans and priorities.

Relationship to Similar Programs in the State and Region

List similar programs within the state and in neighboring states. How does this program compare to those currently being offered?

Distinguished Programs Nationally

For doctoral programs: Supply a select list of distinguished programs nationally in this discipline.

Students

Estimate anticipated enrollments from the program's inception until a steady state or optimum enrollment is reached.

Resources to Support the Program

Briefly describe the additional resources needed to implement and operate the program during the program's first five years, e.g., the number of full-time faculty, number of adjunct faculty, computer equipment, print and non-print material, etc.

Course
Development Plan

Names of faculty
involved

Libraries and
Computing
Facilities

Classrooms and
Laboratories Needs

Catalog Description (For PHD programs, include information about the qualifying exams, and other program milestones.)

Curriculum

Degree Requirements

A minimum of 30 credits is required. Students must attain a minimum GPA of 3.0 in the core courses listed below, and a minimum overall GPA of 3.0.

Degree Options

M.S. in Chemical Engineering (courses only)

Course List

Code	Title	Credits
Core Courses		
CHE 611	Thermodynamics	3
CHE 612	Kinetics of Reactions and Reactor Design	3
CHE 624	Transport Phenomena I	3
CHE 626	Mathematical Methods in Chemical Engineering	3
Elective Courses		
Two electives in chemical engineering		6
Two electives in any engineering, science, or mathematics area including but not limited to chemical engineering		6
Two Elective courses (any subject area)		6
Total Credits		30

1 500-level courses offered in the department do not count toward degree requirements.

1 Before deciding on a thesis topic and advisor, students must discuss thesis topics with at least three faculty members and get their signature on a form provided by the department. The signed form with the name of advisor selected and tentative title of thesis topic must be returned to the department for approval. Change of advisor requires consent of the previous advisor and departmental approval. The completed thesis must be examined and signed by three faculty members at least two of which must be on the department faculty. An oral presentation is also required. The MS thesis committee must be formed and submitted to the department for approval at least one semester before the expected graduation date. The department provides a form for the formation of the MS thesis committee.

2 All students who receive departmental or research-based support must enroll each semester in CHE 791 Graduate Seminar.

3 500-level courses offered in the department do not count toward degree requirements.

M.S. in Chemical Engineering (Master's thesis and/or students receiving department or research-based support)

Course List

Code	Title	Credits
Core Courses		
CHE 611	Thermodynamics	3
CHE 612	Kinetics of Reactions and Reactor Design	3
CHE 624	Transport Phenomena I	3
CHE 626	Mathematical Methods in Chemical Engineering	3
Thesis 1		
CHE 700B	Masters Project	3
CHE 701B	Masters Thesis	6
& CHE 701B	and Masters Thesis	
or CHE 701C	Masters Thesis	

Code	Title	Credits
Seminar		
CHE 791	Graduate Seminar	0
Elective Courses		
One elective in Chemical Engineering		3
One elective in any Engineering, Science, or Mathematics area including but not limited to Chemical Engineering		3
Two elective courses (any subject area)		6
Total Credits		33

1 Before deciding on a thesis topic and advisor, students must discuss thesis topics with at least three faculty members and get their signature on a form provided by the department. The signed form with the name of advisor selected and tentative title of thesis topic must be returned to the department for approval. Change of advisor requires consent of the previous advisor and departmental approval. The completed thesis must be examined and signed by three faculty members at least two of which must be on the department faculty. An oral presentation is also required. The MS thesis committee must be formed and submitted to the department for approval at least one semester before the expected graduation date. The department provides a form for the formation of the MS thesis committee.

2 All students who receive departmental or research-based support must enroll each semester in CHE 791 Graduate Seminar.

Is licensure required of program graduates to gain employment?

Will the institution seek accreditation for this program?

Add any additional information you would like brought to the attention of CUE/ CGE here

This change combines previous two options: MS with Master's thesis and MS for students receiving departmental or research-based support into one combined option. The requirements for both options are identical. No other changes are made.

The M.S. in Chemical Engineering (students receiving departmental or research-based support) GRID has been removed.

Attach any additional information you would like brought to the attention of CUE/ CGE here: Uploaded Files:

Reviewer

Comments

Key: 137

Viewing: CC-CSP-MS : M.S. in Cyber Security and Privacy

Last approved: 09/21/20 5:50 pm

Last edit: 09/14/20 3:17 pm

Catalog Pages Using
this Program
  M.S. in Cyber Security and Privacy

Department(s) /
College(s)

Department	College
Computer Science (CS)	Ying Wu Coll of Computing (CC)

Name of Program   M.S. in Cyber Security and Privacy

Academic Level(s)
  Graduate

Degree Designation   MS

Campus(es) where
the program will be
offered
  Newark

CIP Code

Effective Catalog
Edition

Related
Department(s)

Department(s)
Computer Science (CS)

If the change involves altering the department's curriculum paradigm
as currently outlined in the NJIT catalog, please attach existing and
proposed paradigms.

Articulation with
other institutions, if
any

Objectives

Briefly summarize the program and indicate its objectives; e.g., the nature and focus of the program, the knowledge and skills students will acquire, any cooperative arrangements with other institutions or external agencies in offering this program, etc.

Need

Provide justification of the need for this program. If the program falls within the liberal arts and sciences and does not specifically prepare students for a career, then provide evidence of student demand and indicate opportunities for students to pursue advanced study (if the degree is not terminal with regard to further education). If the program is career-oriented or professional in nature, then in addition to student demand give evidence of labor market need and results of prospective employer surveys. Report labor market need as appropriate on local, regional, and national bases. Specify job titles and entry-level positions for program graduates, and/or indicate opportunities for graduates to pursue additional studies.

Relationship to the University and State Master Plans

Describe the relationship of the program to the following: institutional master plans and priorities.

Relationship to Similar Programs in the State and Region

List similar programs within the state and in neighboring states. How does this program compare to those currently being offered?

Distinguished Programs Nationally

For doctoral programs: Supply a select list of distinguished programs nationally in this discipline.

Students

Estimate anticipated enrollments from the program's inception until a steady state or optimum enrollment is reached.

Resources to Support the Program

Briefly describe the additional resources needed to implement and operate the program during the program's first five years, e.g., the number of full-time faculty, number of adjunct faculty, computer equipment, print and non-print material, etc.

Course
Development Plan

Names of faculty
involved

Libraries and
Computing
Facilities

Classrooms and
Laboratories Needs

Catalog Description (For PHD programs, include information about the qualifying exams, and other program milestones.)

Curriculum

Degree Requirements

An MSCSP course program must satisfy the following distribution requirement:
30 credits are required, which can be satisfied as either one of the following options:
Courses (30 credits)

Courses (27 credits) + MS Project (3 credits)

Courses (24 credits) + MS Thesis (6 credits)

All Core courses are required.

At most two courses can be Foundational courses.

At most two courses can be chosen from outside the Department of Computer Science.

If a student chooses the MS project or MS thesis option, the following two additional rules apply:

The project or thesis must be related to cyber security.

YWCC 691 cannot be taken as an elective course.

Students with non-computing STEM background may be accepted and required to take the following bridge courses (CS 506 may count toward the credits required for the MS degree):

Course List

Code	Title	Credits
Bridge Courses		
CS 280	Programming Language Concepts	3
CS 332	Principles of Operating Systems	3
CS 505	Programming, Data Structures, and Algorithms	3
CS 506	Foundations of Computer Science	3
Total Credits		12

M.S. in Cyber Security and Privacy (courses only)

Course List

Code	Title	Credits
Core Course Requirements		
CS 608	Cryptography and Security	3
CS 645	Security and Privacy in Computer Systems	3
CS 646	Network Protocols Security	3
CS 647	Counter Hacking Techniques	3
CS 656	Internet and Higher-Layer Protocols 1	3
or ECE 637	Internet and Higher-Layer Protocols	
CS 696	Network Management and Security 1	3
or ECE 638	Network Management and Security	
Electives and Foundation Courses		12
Electives		
CS 633	Distributed Systems	
CS 634	Data Mining	
CS 643	Cloud Computing	
CS 648	Cyber Sec Investigations & Law	
CS 660	Digital Watermarking	
CS 673	Software Design and Production Methodology	
CS 678	Topics in Smartphone Sec & Rel	

Code	Title	Credits
CS 680	Linux Kernel Programming	
CS 684	Software Testing and Quality Assurance	
CS 708	Advanced Data Security and Privacy	
CS 755	Security and Privacy in Wireless Networks	
IS 601	Web Systems Development	
IS 650	Data Visualization and Interpretation	
IS 657	Spatiotemporal Urban Analytics	
IS 665	Data Analytics for Info System	
IS 680	Information Systems Auditing	
IS 681	Computer Security Auditing	
IS 682	Forensic Auditing for Computing Security	
IS 687	Transaction Mining and Fraud Detection	
IT 620	Wireless Networks Security and Administration	
IT 640	Network Services Administration	
ECE 636	Computer Networking Laboratory	
MGMT 688	Information Technology, Business and the Law	
MGMT 691	Legal and Ethical Issues	
MATH 661	Applied Statistics	
YWCC 691	Graduate Capstone Project	
Foundational Courses		
CS 610	Data Structures and Algorithms	
CS 630	Operating System Design	
CS 631	Data Management System Design	
Total Credits		30

1Substitution allowed only for students with ECE background and with the permission of the graduate advisor.

M.S. in Cyber Security and Privacy (Master's project option)

Course List

Code	Title	Credits
Core Course Requirements		
CS 608	Cryptography and Security	3
CS 645	Security and Privacy in Computer Systems	3
CS 646	Network Protocols Security	3
CS 647	Counter Hacking Techniques	3
CS 656	Internet and Higher-Layer Protocols	3
or ECE 637	Internet and Higher-Layer Protocols	
CS 696	Network Management and Security	3
or ECE 638	Network Management and Security	
Project		

Code	Title	Credits
CS 700B	Master's Project 1	3
Electives and Foundation Courses		
Electives		9
CS 633	Distributed Systems	
CS 634	Data Mining	
CS 643	Cloud Computing	
CS 648	Cyber Sec Investigations & Law	
CS 660	Digital Watermarking	
CS 673	Software Design and Production Methodology	
CS 678	Topics in Smartphone Sec & Rel	
CS 680	Linux Kernel Programming	
CS 684	Software Testing and Quality Assurance	
CS 708	Advanced Data Security and Privacy	
CS 755	Security and Privacy in Wireless Networks	
IS 601	Web Systems Development	
IS 650	Data Visualization and Interpretation	
IS 657	Spatiotemporal Urban Analytics	
IS 665	Data Analytics for Info System	
IS 680	Information Systems Auditing	
IS 681	Computer Security Auditing	
IS 682	Forensic Auditing for Computing Security	
IS 687	Transaction Mining and Fraud Detection	
IT 620	Wireless Networks Security and Administration	
IT 640	Network Services Administration	
ECE 636	Computer Networking Laboratory	
MGMT 688	Information Technology, Business and the Law	
MGMT 691	Legal and Ethical Issues	
MATH 661	Applied Statistics	
Foundational Courses		
CS 610	Data Structures and Algorithms	
CS 630	Operating System Design	
CS 631	Data Management System Design	
Total Credits		30

1 The project must be related to cyber security.

2 Substitution allowed only for students with ECE background and with the permission of the graduate advisor.

M.S. in Cyber Security and Privacy (Master's thesis option)

Course List

Code	Title	Credits

Code	Title	Credits
Core Course Requirements		
CS 608	Cryptography and Security	3
CS 645	Security and Privacy in Computer Systems	3
CS 646	Network Protocols Security	3
CS 647	Counter Hacking Techniques	3
CS 656	Internet and Higher-Layer Protocols 2	3
or ECE 637	Internet and Higher-Layer Protocols	
CS 696	Network Management and Security 2	3
or ECE 638	Network Management and Security	
Thesis		
CS 701C	Master's Thesis 1	6
Electives and Foundation Courses		6
Electives		
CS 633	Distributed Systems	
CS 634	Data Mining	
CS 643	Cloud Computing	
CS 648	Cyber Sec Investigations & Law	
CS 660	Digital Watermarking	
CS 673	Software Design and Production Methodology	
CS 678	Topics in Smartphone Sec & Rel	
CS 684	Software Testing and Quality Assurance	
CS 680	Linux Kernel Programming	
CS 708	Advanced Data Security and Privacy	
CS 755	Security and Privacy in Wireless Networks	
IS 601	Web Systems Development	
IS 650	Data Visualization and Interpretation	
IS 657	Spatiotemporal Urban Analytics	
IS 665	Data Analytics for Info System	
IS 680	Information Systems Auditing	
IS 681	Computer Security Auditing	
IS 682	Forensic Auditing for Computing Security	
IS 687	Transaction Mining and Fraud Detection	
IT 620	Wireless Networks Security and Administration	
IT 640	Network Services Administration	
ECE 636	Computer Networking Laboratory	
MGMT 688	Information Technology, Business and the Law	
MGMT 691	Legal and Ethical Issues	
MATH 661	Applied Statistics	
Foundational Courses		

Code	Title	Credits
CS 610	Data Structures and Algorithms	
CS 630	Operating System Design	
CS 631	Data Management System Design	
Total Credits		30

1 The thesis must be related to cyber security.

2 Substitution allowed only for students with ECE background and with the permission of the graduate advisor.

Master of Science in Cyber Security and Privacy (CSP) - Cyber Defense Option

The objective of the Cyber Defense Professional Science Master (PSM), an option of the MS CSP, is to create leaders with strong communication and management skills in addition to the strong technical knowledge in security and privacy of computer systems, networks and web applications. This PSM is designed for working professionals or students who already have acquired some professional experience. The Cyber Defense PSM is affiliated with the PSM National Office.

A student in the MS CSP – Cyber Defense Option must satisfy the following distribution of requirements:

36 credits are required.

All Cybersecurity Core courses are required (21 credits)

The rest of 15 credits must be taken from the combined list of PTC (Professional and Technical Communications), Management, and Computing electives, with at least 3 credits, and no more than 6, from each of the 3 elective lists

Among the required Cybersecurity Core courses, the program includes an MS Project, YWCC 691. These projects are part of a project course, supervised by a CS faculty member, and done in collaboration with industrial partners. These partners will propose projects, and they will co-supervise the students together with the instructor of the course. Students who have a job are allowed to work on projects from their companies, in which case their employer will be actively engaged in the project supervision. The projects will generally be done in teams of 3 students.

<div align="center">Course List</div>

Code	Title	Credits
Core Course Requirements:		
CS 608	Cryptography and Security	3
CS 645	Security and Privacy in Computer Systems	3
CS 646	Network Protocols Security	3
CS 647	Counter Hacking Techniques	3
CS 656	Internet and Higher-Layer Protocols	3
CS 696	Network Management and Security	3
YWCC 691	Graduate Capstone Project	3
PTC (Professional and Technical Communications) Courses		6
PTC 601	Advanced Professional and Technical Communication	
PTC 620	Proposal Writing	
PTC 622	Working in Teams: Collaborative and Interpersonal Communications	
PTC 624	Professional and Technical Editing	

Code	Title	Credits
PTC 628	Analyzing Social Networks	
PTC 629	Theory and Practice of Social Media	
PTC 632	Content Management and Information Architecture	
Management Courses		**6**

Select two of the following:

Code	Title	Credits
ACCT 615	Management Accounting	
EM 636	Project Management	
FIN 600	Corporate Finance I	
MGMT 641	Global Project Management	
MGMT 650	Knowledge Management	
MGMT 682	Business Research Methods I	
MGMT 688	Information Technology, Business and the Law	
MGMT 691	Legal and Ethical Issues	
Cybersecurity Elective Courses		**6**
CS 610	Data Structures and Algorithms	
CS 630	Operating System Design	
CS 631	Data Management System Design	
CS 632	Advanced Database System Design	
CS 634	Data Mining	
CS 643	Cloud Computing	
CS 648	Cyber Sec Investigations & Law	
CS 660	Digital Watermarking	
CS 673	Software Design and Production Methodology	
CS 700B	Master's Project	
CS 708	Advanced Data Security and Privacy	
CS 678	Topics in Smartphone Sec & Rel	
CS 684	Software Testing and Quality Assurance	
CS 708	Advanced Data Security and Privacy	
CS 755	Security and Privacy in Wireless Networks	
IS 601	Web Systems Development	
IS 650	Data Visualization and Interpretation	
IS 657	Spatiotemporal Urban Analytics	
IS 665	Data Analytics for Info System	
IS 680	Information Systems Auditing	
IS 681	Computer Security Auditing	
IS 682	Forensic Auditing for Computing Security	
IT 620	Wireless Networks Security and Administration	
IT 640	Network Services Administration	
ECE 636	Computer Networking Laboratory	

Code	Title	Credits
MATH 661	Applied Statistics	

Is licensure required of program graduates to gain employment?

No

Will the institution seek accreditation for this program?

No

Add any additional
information you
would like brought
to the attention of
CUE/ CGE here

I have added the following electives to the Cyber Defense professional masters option:

IS 601, IS 650, IS 657, IS 665, MATH 661

Attach any additional information you would like brought to the
attention of CUE/ CGE here: Uploaded Files:

Reviewer
Comments

Key: 121

Viewing: CC-DS-MS : M.S. in Data Science – Computational Track

Last approved: 09/21/20 5:50 pm

Last edit: 09/02/20 7:23 pm

Catalog Pages Using this Program

M.S. in Data Science - Computational Track

Department(s) / College(s)

Department	College
Computer Science (CS)	Ying Wu Coll of Computing (CC)

Name of Program   M.S. in Data Science – Computational Track

Academic Level(s)
  Graduate

Degree Designation   MS

Campus(es) where the program will be offered
  Newark

CIP Code

Effective Catalog Edition

Related Department(s)

Department(s)
Mathematics (MATH)

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Articulation with
other institutions, if
any

Objectives

Briefly summarize the program and indicate its objectives; e.g., the nature and focus of the program, the knowledge and skills students will acquire, any cooperative arrangements with other institutions or external agencies in offering this program, etc.

Need

Provide justification of the need for this program. If the program falls within the liberal arts and sciences and does not specifically prepare students for a career, then provide evidence of student demand and indicate opportunities for students to pursue advanced study (if the degree is not terminal with regard to further education). If the program is career-oriented or professional in nature, then in addition to student demand give evidence of labor market need and results of prospective employer surveys. Report labor market need as appropriate on local, regional, and national bases. Specify job titles and entry-level positions for program graduates, and/or indicate opportunities for graduates to pursue additional studies.

Relationship to the University and State Master Plans

Describe the relationship of the program to the following: institutional master plans and priorities.

Relationship to Similar Programs in the State and Region

List similar programs within the state and in neighboring states. How does this program compare to those currently being offered?

Distinguished Programs Nationally

For doctoral programs: Supply a select list of distinguished programs nationally in this discipline.

Students

Estimate anticipated enrollments from the program's inception until a steady state or optimum enrollment is reached.

Resources to Support the Program

Briefly describe the additional resources needed to implement and operate the program during the program's first five years, e.g., the number of full-time faculty, number of adjunct faculty, computer equipment, print and non-print material, etc.

Course
Development Plan

Names of faculty
involved

Libraries and
Computing
Facilities

Classrooms and
Laboratories Needs

Catalog Description (For PHD programs, include information about the qualifying exams, and other program milestones.)

Curriculum

Degree Requirements

Students in the Master of Science in Data Science (MSDS) program must successfully complete 30 credits based on any of the following options:
Courses (30 credits)

Courses (27 credits) + MS Project (3 credits)

Courses (24 credits) + MS Thesis (6 credits)

Independent of the chosen option, all core courses in the respective tracks are required.

At most two courses can be chosen from outside the respective track with approval of the respective Program Co-Directors. Computational track students are allowed at most three electives that are non-Computer Science courses. Statistics track students are allowed at most three electives that are non-Math courses. ⌊SEP⌋

If a student chooses the MS project or MS thesis option, the project or thesis must be related to data science and requires approval from one of the Program Co-Directors.

The MSDS program has computational and statistics tracks that students must choose from at admission time. These tracks have different core courses but share the same admission requirements and electives.

Students may choose an elective outside the list after approval of their respective advisor.

M.S. in Data Science

Course List

Code	Title	Credits
Core Course Requirements for Computational Track		
CS 675	Machine Learning	3
CS 644	Introduction to Big Data	3
CS 636	Data Analytics with R Program	3
CS 677	Deep Learning (Deep Learning)	3
MATH 661	Applied Statistics	3

Course List

Code	Title	Credits
Electives and Foundation Courses		15
Computer Science Electives		
CS 610	Data Structures and Algorithms	3
CS 631	Data Management System Design	3
CS 632	Advanced Database System Design	3
CS 634	Data Mining	3
CS 636	Data Analytics with R Program (only available to students in the Math core)	3
CS 639	Elec. Medical Records: Med Terminologies and Comp. Imp.	3
CS 643	Cloud Computing	3
CS 645	Security and Privacy in Computer Systems	3
CS 656	Internet and Higher-Layer Protocols	3
CS 659	Image Processing and Analysis	3
CS 661	Systems Simulation	3
CS 670	Artificial Intelligence	3
CS 676	Cognitive Computing	3
CS 677	Deep Learning (Deep Learning(available only to students in statistics track))	3
CS 683	Software Project Management	3

Code	Title	Credits
CS 684	Software Testing and Quality Assurance	3
CS 681	Computer Vision	3
CS 708	Advanced Data Security and Privacy	3
CS 731	Applications of Database Systems	3
CS 732	Advanced Machine Learning	3
CS 735	High Performance Analytics Dat	3
CS 744	Data Mining and Management in Bioinformatics	3
CS 782	Pattern Recognition and Applications	3
YWCC 691	Graduate Capstone Project (Counting towards the elective credits requires the program director's prior approval. In addition, it needs to be completed with an external partner (industry, lab, or government), or with a faculty only if the same faculty is not the student's MS project or MS thesis advisor.)	3

Math Electives

Code	Title	Credits
MATH 630	Linear Algebra and Applications	3
MATH 631	Linear Algebra	3
MATH 644	Regression Analysis Methods	3
MATH 660	Introduction to statistical Computing with SAS and R (only available to students in computational track)	3
MATH 662	Probability Distributions	3
MATH 664	Methods for Statistical Consulting	3
MATH 665	Statistical Inference	3
MATH 678	Stat Methods in Data Science	3
CS 680	Linux Kernel Programming	3
CS 683	Software Project Management	3
MATH 699	Design and Analysis of Experiments	3
MATH 717	Inverse Problems and Global Optimization	3
MATH 786	Large Sample Theory and Inference	3
MATH 787	Non-Parametric Statistics	3

Other Electives

Code	Title	Credits
BIOL 638	Computational Ecology	3
BME 698	Selected Topics	3
MGMT 635	Data Mining and Analysis	3
MGMT 630	Decision Analysis	3
FIN 600	Corporate Finance I	3
FIN 641	Derivatives Markets	3
FIN 642	Derivatives and Structured Finance	3
MRKT 630	Models Of Consumer Behavior	3
IS 601	Web Systems Development	3
IS 631	Enterprise Database Management	3

Code	Title	Credits
IS 650	Data Visualization and Interpretation	3
IS 657	Spatiotemporal Urban Analytics	3
IS 665	Data Analytics for Info System	3
IS 687	Transaction Mining and Fraud Detection	3
IS 688	Web Mining	3
BNFO 601	Foundations of Bioinformatics I	3
BNFO 602	Foundations of Bioinformatics II	3
BNFO 615	Data Analysis in Bioinformatics	3
BNFO 620	Genomic Data Analysis	3
Total Credits		30

Recommended course sequence M.S. in Data Science for Computational Track

Course Sequence		
	Fall	Spring
Year 1	CS 675 Machine Learning	CS 631 Data Management and System Design
	MATH 661 Applied Statistics	CS 644 Big Data
	CS 636 R for Data Science	CS 677 Deep Learning
Year 2	Free elective or Master thesis course	Free elective or Masters thesis course
	Free elective or Master project course	
	Free elective	

Is licensure required of program graduates to gain employment?

Will the institution seek accreditation for this program?

Add any additional information you would like brought to the attention of CUE/ CGE here

The two tracks in this program are administered by two departments, CS and DMS. Thus, I think it is reasonable to list MS in Data Science – Statistics Track in the CSLA list of graduate programs, as per Dr. Michalopoulou's request. In addition, I think that in the YWCC listing of degrees we should list MS in Data Science – Computational Track. Each of the two listings will be leading to the entire program description the way it is now. (Email Received July 10-2020)

Attach any additional information you would like brought to the attention of CUE/ CGE here: Uploaded Files:

Reviewer
Comments

Key: 122

Viewing: **EN-IE-PHD : PHD. in Industrial Engineering**

Last approved: 09/21/20 5:50 pm

Last edit: 07/12/20 10:37 pm

Catalog Pages Using
this Program
  Ph.D. in Industrial Engineering

Department(s) /
College(s)

Department	College
Mechanical & Industrial Engr (MIE)	Newark College of Engineering (EN)

Name of Program   PHD. in Industrial Engineering

Academic Level(s)
  Doctoral

Degree Designation   PHD

Campus(es) where
the program will be
offered
  Newark

CIP Code

Effective Catalog
Edition

Related
Department(s)

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as currently outlined in the NJIT catalog, please attach existing and
proposed paradigms.

Articulation with
other institutions, if
any

Objectives

Briefly summarize the program and indicate its objectives; e.g., the nature and focus of the program, the knowledge and skills students will acquire, any cooperative arrangements with other institutions or external agencies in offering this program, etc.

NA

Need

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NA

Relationship to the University and State Master Plans

Describe the relationship of the program to the following: institutional master plans and priorities.

NA

Relationship to Similar Programs in the State and Region

List similar programs within the state and in neighboring states. How does this program compare to those currently being offered?

NA

Distinguished Programs Nationally

For doctoral programs: Supply a select list of distinguished programs nationally in this discipline.

Students

Estimate anticipated enrollments from the program's inception until a steady state or optimum enrollment is reached.

NA

Resources to Support the Program

Briefly describe the additional resources needed to implement and operate the program during the program's first five years, e.g., the number of full-time faculty, number of adjunct faculty, computer equipment, print and non-print material, etc.

NA

Course
Development Plan
NA

Names of faculty
involved
NA

Libraries and
Computing
Facilities
NA

Classrooms and
Laboratories Needs
NA

Catalog Description (For PHD programs, include information about the qualifying exams, and other program milestones.)

The objectives of the Ph.D. in Industrial Engineering program are to provide the knowledge and develop the skills that students need to become leaders of research in academia, industry and government. The program is for superior students with a master's or bachelor's degrees in industrial engineering or a closely related field. This program is intended for highly qualified students who wish to pursue advanced research in industrial engineering and related areas. The program emphasizes two areas: supply chain and manufacturing systems, and operations research applications. Students can be admitted with an appropriate BS or MS degree.

Curriculum

Degree Requirements

Ph.D. students with a recognized Master's degree or equivalent are required to take four 700-level 3-credit courses (12 credits). Ph.D. students with a recognized Baccalaureate degree are required to take eight 600-level or 700-level 3-credit courses (24 credits) of coursework beyond the Baccalaureate degree as well as four additional 700-level 3-credit courses (12 credits), for a total of twelve 3-credit courses (36 credits).

The department approves specific degree requirements and dissertation topics on an individual basis. Students must attain a minimum overall GPA of 3.0. Students must conduct independent original research in a specific area of industrial engineering. Key milestones for a Ph.D. students are: (i) Complete 12 credits of courses work beyond the Masters or 36 credits beyond the Bachelors , including at least 12 credits at the 700 level, (ii) Pass the Qualifying Exam (ii) Select a dissertation advisor and defend the research proposal and (iv) submit and pass the Ph.D. dissertation exam. For dissertation credit registration requirements please see http://www5.njit.edu/graduatestudies/content/new-phd-credit-requirements/ .

Program deadlines for full-time students: The required coursework for the Ph.D. program and the (major part of the) QE must be completed successfully by the end of the second year in the program. The dissertation proposal must be defended successfully either by the end of the third year in the Ph.D. program or four semesters after registering for the first time in the 792 pre-doctoral research course, whichever occurs earlier. The dissertation must be defended successfully by the end of the sixth year in the Ph.D. program.

Qualifying Examination

All student are expected to pass a written qualifying exam. The exam is organized into two parts each of four hours duration (A) Mathematics, Probability and Statistics and (B) Industrial Engineering Topics. Part B will focus on seven different industrial engineering topics (i) Human Factors (ii) Operations Research (iii) Supply Chain and Production Planning (iv) Simulation Modeling (v) Reliability and Quality Control (vi) Engineering Economy and (vii) Manufacturing Processes. The test is administered 1-2 times a year, and a pass/fail grade is assigned to each section. A student can appear for the exam a maximum of 2 times.

Dissertation Proposal Examination

Doctoral students must prepare a written research proposal and make an oral presentation for approval by their dissertation committee. The proposal must be presented after formation of the committee but within one year after passing the qualifying examination. Research is expected to investigate or develop a unique contribution to science and technology.

Dissertation Defense

When the novel and independent dissertation research conducted by a doctoral student produces sufficient and significant results, the student, in consultation with his/her dissertation committee, will prepare for the completion of the dissertation. An oral defense of the dissertation with the dissertation committee is required

after submission of the final document to the department for approval. Signatures of all members of the dissertation committee must be received for final approval to be granted.

Is licensure required of program graduates to gain employment?

Will the institution seek accreditation for this program?

Add any additional
information you
would like brought
to the attention of
CUE/ CGE here

Attach any additional information you would like brought to the
attention of CUE/ CGE here: Uploaded Files:

Reviewer
Comments

Key: 296

Viewing: **CC-CS-MS : M.S. in Computer Science**

Last approved: 09/21/20 5:50 pm

Last edit: 09/04/20 4:17 pm

Catalog Pages Using
this Program

[M.S. in Computer Science](#)

Department(s) /
College(s)

Department	College
Computer Science (CS)	Ying Wu Coll of Computing (CC)

Name of Program   M.S. in Computer Science

Academic Level(s)
  Graduate

Degree Designation   MS

Campus(es) where
the program will be
offered
  Newark

CIP Code

Effective Catalog
Edition

Related
Department(s)

If the change involves altering the department's curriculum paradigm
as currently outlined in the NJIT catalog, please attach existing and
proposed paradigms.

Articulation with
other institutions, if

any

Objectives

Briefly summarize the program and indicate its objectives; e.g., the nature and focus of the program, the knowledge and skills students will acquire, any cooperative arrangements with other institutions or external agencies in offering this program, etc.

Need

Provide justification of the need for this program. If the program falls within the liberal arts and sciences and does not specifically prepare students for a career, then provide evidence of student demand and indicate opportunities for students to pursue advanced study (if the degree is not terminal with regard to further education). If the program is career-oriented or professional in nature, then in addition to student demand give evidence of labor market need and results of prospective employer surveys. Report labor market need as appropriate on local, regional, and national bases. Specify job titles and entry-level positions for program graduates, and/or indicate opportunities for graduates to pursue additional studies.

Relationship to the University and State Master Plans

Describe the relationship of the program to the following: institutional master plans and priorities.

Relationship to Similar Programs in the State and Region

List similar programs within the state and in neighboring states. How does this program compare to those currently being offered?

Distinguished Programs Nationally

For doctoral programs: Supply a select list of distinguished programs nationally in this discipline.

Students

Estimate anticipated enrollments from the program's inception until a steady state or optimum enrollment is reached.

Resources to Support the Program

Briefly describe the additional resources needed to implement and operate the program during the program's first five years, e.g., the number of full-time faculty, number of adjunct faculty, computer equipment, print and non-print material, etc.

Course
Development Plan

Names of faculty
involved

Libraries and
Computing
Facilities

Classrooms and
Laboratories Needs

Catalog Description (For PHD programs, include information about the qualifying exams, and other program milestones.)

Curriculum

Degree Requirements

Students will meet with the graduate advisor to assist them in formulating a program of study and selecting a possible specialization.
The 30 credit requirement may be satisfied in one of three ways:
Courses (30 credits)
Courses (27 credits) + MS Project (3 credits)
Courses (24 credits) + MS Thesis (6 credits)

Students with non-computing STEM background may be accepted and required to take the following bridge courses (CS 506 may count toward the credits required for the MS degree):

M.S. in Computer Science (courses only)

Course List

Code	Title	Credits
Bridge Courses		
CS 280	Programming Language Concepts	3
CS 332	Principles of Operating Systems	3
CS 505	Programming, Data Structures, and Algorithms 1	3
CS 506	Foundations of Computer Science 2	3
Total Credits		12

1 CS 505 Programming, Data Structures, and Algorithms requires prior knowledge of higher level programming language. For students with no prior programming experiences, CS 113 Introduction to Computer Science and CS 114 Introduction to Computer Science II are recommended for replacement.

2 The credits earned for CS 506 Foundations of Computer Science count towards the 30 credits required for the degree.

Course List

Code	Title	Credits
Core Courses		
CS 610	Data Structures and Algorithms	3
or CS 667	Design Techniques for Algorithms	
Select three of the following:		9
CS 631	Data Management System Design	
CS 630	Operating System Design	
CS 650	Computer Architecture	
CS 656	Internet and Higher-Layer Protocols	
Elective Courses		
Two courses from an approved list of advanced courses		6
Course either from the Computer Science graduate catalog or from another department's graduate catalog 1		3
Three courses from the Computer Science graduate catalog or IS 601, IS 650, IS 657, IS 665, MATH 661, YWCC 691 2		9
Total Credits		30

1 Courses from outside the Computer Science Department must be relevant to the Computer Science program and require prior approval.

2 YWCC 691 can be counted towards the 30 credits required for the degree only if no more than 6 out of the 30 credits are earned from non-lecture courses.

M.S. in Computer Science (Master's project)

Course List

Code	Title	Credits
Bridge Courses		
CS 350	Intro to Computer Systems	3
CS 332	Principles of Operating Systems	3
CS 505	Programming, Data Structures, and Algorithms 1	3
CS 506	Foundations of Computer Science 2	3
Total Credits		12

1 CS 505 Programming, Data Structures, and Algorithms requires prior knowledge of higher level programming language. For students with no prior programming experiences, CS 113 Introduction to Computer Science and CS 114 Introduction to Computer Science II are recommended for replacement.

2 The credits earned for CS 506 Foundations of Computer Science count towards the 30 credits required for the degree.

Course List

Code	Title	Credits
Core Courses		
CS 610	Data Structures and Algorithms	3
or CS 667	Design Techniques for Algorithms	
Select three of the following:		9
CS 631	Data Management System Design	
CS 630	Operating System Design	
CS 650	Computer Architecture	
CS 656	Internet and Higher-Layer Protocols	
Project		
CS 700B	Master's Project	3
Elective Courses		
One course from an approved list of advanced courses		3
Course either from the Computer Science graduate catalog or from another department's graduate catalog 1		3
Three courses from the Computer Science graduate catalog or IS 601, IS 650, IS 657, IS 665, MATH 661, YWCC 691 2		9
Total Credits		30

1 Courses from outside the Computer Science Department must be relevant to the Computer Science program and require prior approval.

2 YWCC 691 can be counted towards the 30 credits required for the degree only if no more than 6 out of the 30 credits are earned from non-lecture courses.

M.S. in Computer Science (Master's thesis)

Course List

Code	Title	Credits

Code	Title	Credits
Bridge Courses		
CS 332	Principles of Operating Systems	3
CS 350	Intro to Computer Systems	3
CS 505	Programming, Data Structures, and Algorithms 1	3
CS 506	Foundations of Computer Science 2	3
Total Credits		12

1 CS 505 Programming, Data Structures, and Algorithms requires prior knowledge of higher level programming language. For students with no prior programming experiences, CS 113 Introduction to Computer Science and CS 114 Introduction to Computer Science II are recommended for replacement.

2 The credits earned for CS 506 Foundations of Computer Science count towards the 30 credits required for the degree.

<div align="center">Course List</div>

Code	Title	Credits
Core Courses		
CS 610	Data Structures and Algorithms	3
or CS 667	Design Techniques for Algorithms	
Select three of the following:		9
CS 631	Data Management System Design	
CS 630	Operating System Design	
CS 650	Computer Architecture	
CS 656	Internet and Higher-Layer Protocols	
Thesis		
CS 701B	Master's Thesis	6
& CS 701B	and Master's Thesis	
or CS 701C	Master's Thesis	
Elective Courses		
Course either from the Computer Science graduate catalog or from another department's graduate catalog 1		3
Three courses from the Computer Science graduate catalog or IS 601, IS 650, IS 657, IS 665, MATH 661		9
Total Credits		30

1 Courses from outside the Computer Science Department must be relevant to the Computer Science program and require prior approval.

2 A student must select a specialization, and the thesis must match the selected specialization.

Specializations

Students can optionally specialize in a specific area (see below) by taking a minimum of three (3) courses listed in the specialization in accordance with requirements (b) and (c). Note that some specialization courses have prerequisites that must be fulfilled before enrolling in these courses.

Computer Networking and Security

Course List

Code	Title	Credits
Select three of the following:		9
CS 608	Cryptography and Security	
CS 633	Distributed Systems	
CS 652	Computer Networks-Architectures, Protocols and Standards	
CS 696	Network Management and Security	
IS 681	Computer Security Auditing	
Total Credits		9

Databases and Data Mining

Course List

Code	Title	Credits
Select three of the following:		9
CS 632	Advanced Database System Design	
CS 731	Applications of Database Systems	
CS 634	Data Mining	
BNFO 644	Data Mining and Management in Bioinformatics	
CS 744	Data Mining and Management in Bioinformatics 1	
CS 700B	Master's Project 1	
Total Credits		9

1 Taking CS 700 level courses require permission of the graduate advisor.

Image Processing and Pattern Recognition

Course List

Code	Title	Credits
Select three of the following:		9
CS 659	Image Processing and Analysis	
CS 681	Computer Vision	
CS 759	Advanced Image Processing and Analysis 1	
CS 700B	Master's Project 1	
Total Credits		9

1 Taking CS 700 level courses require permission of the graduate advisor.

Computer Algorithms

Course List

Code	Title	Credits
CS 611	Introduction to Computability and Complexity	3
CS 667	Design Techniques for Algorithms	3
CS 700B	Master's Project	3
Total Credits		9

Bioinformatics

Course List

Code	Title	Credits
Select three of the following:		9
BNFO 601	Foundations of Bioinformatics I	
BNFO 602	Foundations of Bioinformatics II	
CS 744	Data Mining and Management in Bioinformatics 1	
MATH 663	Introduction to Biostatistics	
CS 700B	Master's Project 1	
Total Credits		9

1 Taking CS 700 level courses require permission of the graduate advisor.

Master's Project

Students must

Enroll in CS 700B Master's Project.

In the semester prior to enrolling in CS 700B Master's Project, the student must prepare and submit a project proposal to the Department no later than the last weekday class day of the 8th week of the

Fall semester for a spring project, or

Spring semester for a summer or fall project.

The student must have an advisor in the Computer Science Department who is a tenure- track faculty member or who holds a joint appointment in the department.

Project Requirements

Before a student pursues a Master's Project, the following requirements must be fully satisfied:

All bridge courses must be completed - In the semester prior to the project, a student prepares and submits a project proposal to the Department no later than the last weekday class day of the 8th week of the Fall semester for a spring project and no later than the last weekday class day of the 8th week of the Spring semester for a summer or fall project. The preparatory work for the proposal may be accomplished within the framework of a required course or an independent study course offered by the prospective advisor. Therefore, such a course must be taken in the semester prior to the project.

A CS Department tenure-track faculty member or a faculty member who holds a joint appointment in the computer science department can advise an MS project.

Proposal preparation must adhere to the existing departmental guidelines; the information and templates are available online.

Thesis Option

(30 credits)

Students must

select a specialization, and

enroll in the Thesis CS 701 course for two (2) semesters (Thesis must match specialization).

A student can enroll in CS 701 during the second semester of full time study. Normally the student enrolls for two semesters of CS 701 to prepare the thesis proposal, perform the research, and prepare the thesis. The thesis must be orally defended and follow the style set forth by the Graduate School at NJIT. The thesis committee is

composed of a Computer Science tenure-track committee chair and two other tenure-track members of the Computer Science Department or Faculty holding a joint appointment to the department.

Thesis Requirements

Before a student pursues a Master's Thesis, the following requirements must be fully satisfied:

All bridge courses must be completed.

In the semester prior to the thesis, a student prepares and submits a thesis proposal to the department no later than week 8 of the Fall semester for a spring thesis and week 8 of the Spring semester for a summer of fall thesis. The preparatory work for the proposal may be accomplished within the framework of a required course or an independent study course offered by the prospective advisor. Therefore, such a course must be taken in the semester prior to the thesis.

A CS department tenure-track faculty member or a faculty member who holds a joint appointment in the Computer Science Department can advise an MS thesis.

A thesis must adhere to the style requirements set forth by the Graduate School:

https://www.njit.edu/graduatestudies/thesis.php.

An oral defense is required. The defense must take place between one week prior to the Reading Day of the semester and the last day of the Examination period. A committee of at least three tenure-track faculty members from the CS Department, including the thesis advisor, collectively determines the grade for CS 701 at the conclusion of the oral defense.

Other Policies

Transfer: Transfer of computer science courses from other US/Canada institutions is allowed as per university regulations provided that these courses are related to the program. Graduate Advisor and Graduate Studies Office approvals are required.

MS/MS Program: Under the University MS/MS program, up to six credits of courses taken in other departments can be used for graduate credits toward the degree as long as these courses are related to computer science. Graduate advisor and Graduate Studies Office approvals are required.

Co-op Program: Before a student applies for CS 590 Graduate Co-op Work Experience I/CS 591 Graduate Co-op Work Experience II/CS 592 Graduate Co-op Work Experience III registration, the successful completion of the bridge program, all ESL requirements, and at least four graduate courses is required.

The same course cannot satisfy two or more requirements.

CS Advanced Courses

Course List

Code	Title	Credits
CS 611	Introduction to Computability and Complexity	3
CS 632	Advanced Database System Design	3
CS 643	Cloud Computing	3
CS 659	Image Processing and Analysis	3
CS 661	Systems Simulation	3
CS 667	Design Techniques for Algorithms	3
CS 670	Artificial Intelligence	3

Code	Title	Credits
CS 673	Software Design and Production Methodology	3
CS 677	Deep Learning	3
CS 680	Linux Kernel Programming	3
CS 681	Computer Vision	3
CS 696	Network Management and Security	3
CS 704	Sequencing and Scheduling	3
CS 731	Applications of Database Systems	3
CS 744	Data Mining and Management in Bioinformatics	3
CS 750	High Performance Computing	3
CS 759	Advanced Image Processing and Analysis	3
CS 782	Pattern Recognition and Applications	3

Is licensure required of program graduates to gain employment?

Will the institution seek accreditation for this program?

Add any additional
information you
would like brought
to the attention of
CUE/ CGE here

Attach any additional information you would like brought to the
attention of CUE/ CGE here: Uploaded Files:

Reviewer
Comments

Key: 123