

Catalogue currently reads:

M.A. in History

Degree Requirements

A minimum of 30 credits is required, including 18 in a major field and 6 in a minor field chosen in consultation with a faculty advisor. The remaining 6 credits may be completed through a Master's Thesis or a combination of a Master's Essay and an additional course.

The following is a sample curriculum for a student completing a major field of study (18 credits) in the History of Technology, Environment and Medicine/Health.

M.A. in History, History of Technology, Environment, and Medicine/Health (Master's essay)

Code	Title	Credits
Major Field Courses		
HIST 622	Culture and Science in the History of American Medicine	3
HIST 628	Gender, Science and Technology in the Modern World	3
HIST 632	Global Hist of Tech & Culture	3
HIST 634	Environmental History of North America	3
HIST 635	History of Technology, Environment and Medicine: Theory and Method	3
HIST 656	Topics in the History of Health	3
Minor Field Courses		
Two 600 or 700 level courses in either American History or World History		6
Elective Courses		
One 600 or 700 level course		3
Essay		
HIST 702	Master's Essay	3
Total Credits		30
Course List		

M.A. in History, History of Technology, Environment, and Medicine/Health (Master's thesis)

Code	Title	Credits
Major Field Courses		
HIST 622	Culture and Science in the History of American Medicine	3
HIST 628	Gender, Science and Technology in the Modern World	3
HIST 632	Global Hist of Tech & Culture	3
HIST 634	Environmental History of North America	3
HIST 635	History of Technology, Environment and Medicine: Theory and Method	3
HIST 656	Topics in the History of Health	3
Minor Field Courses		

Code	Title	Credits
Two 600 or 700 level courses in either American History or World History		6
Thesis		
<u>HIST 701C</u>	Master'S Thesis	6
Total Credits		30
Course List		

Proposed changes:

M.A. in History

Degree Requirements

A minimum of 30 credits is required, including 18 in a major field and 6 in courses outside of the major field~~a minor field~~ chosen in consultation with a faculty advisor. The remaining 6 credits may be completed through a Master's Thesis or a combination of a Master's Essay and an additional course.

Major Field

The M.A. program in history offers a choice of three major fields in areas that are particularly well supported by the research and teaching interests of the history faculty:

- American History
- World History
- History of Technology, Environment and Medicine/Health

To ensure a program of reasonable depth and coherence, each student takes at least 18 credits of course work in one of these major fields, chosen in consultation with the Graduate History Director or designated advisor.

Courses Outside the Major Field

To add breadth and diversity to the program of study, each M.A. candidate must take at least two courses (6 credits) outside of the chosen major field, often selected from among the two major fields in which a student does not have a primary concentration (e.g., a student with a major field in American History may elect a minor field in World History or in History of Technology, Environment and Medicine/Health). It is preferable that both courses be in the same field, but this is not required.

Master's Thesis

Students pursuing the Thesis Option earn 6 credits for the thesis, which should be a sustained work of scholarship written under the supervision of a qualified faculty advisor. The thesis will normally be on a topic within a student's major field. It must be based on primary source research.

Master's Essay

Students who do not elect to write a thesis must write a 3 credit Master's Essay. The Master's Essay is a substantial piece of written work, the capstone of the M.A./M.A.T. program for those students who elect not to write a 6-credit Master's Thesis. The essay is undertaken in consultation with an advisor, and may take one of several forms:

1. An interpretive historical essay based on research in primary sources, in form much like the M.A. thesis, but shorter.
2. A short work of narrative history, emphasizing form as well as content of the writing, also based on research in primary sources. (prerequisite: 26:510:504 Reading and Writing Narrative History, or 26:510:505 History in Fiction and Fact, or 26:510:506 The Poetics of History)
3. A historiographical essay, reviewing the literature on a particular problem in, or aspect of, history.
4. A design for a new curriculum, either a course or a significant portion of a course, with the focus on content more than on pedagogy.
5. A design for an exhibition in a historical museum or another appropriate work in public history. (prerequisite: 26:510:565 Public History)

The following is a sample curriculum for a student completing a major field of study (18 credits) in the History of Technology, Environment and Medicine/Health.

M.A. in History, History of Technology, Environment, and Medicine/Health (Master's thesis option)

Code	Title	Credits
Major Field Courses		
600 Level Courses in Major Field		18
<u>HIST 622</u>	Culture and Science in the History of American Medicine	3
<u>HIST 628</u>	Gender, Science and Technology in the Modern World	3
<u>HIST 632</u>	Global Hist of Tech & Culture	3
<u>HIST 634</u>	Environmental History of North America	3
<u>HIST 635</u>	History of Technology, Environment and Medicine: Theory and Method	3
<u>HIST 656</u>	Topics in the History of Health	3
Elective Courses Courses Outside the Major Field		
Two 600 or 700 level courses in either American History or World History <u>outside of the major field</u>		6
Thesis		
<u>HIST 701C</u>	Master's Thesis	6
Total Credits		30
Course List		

M.A. in History ~~History of Technology, Environment, and Medicine/Health~~ (Master's essay option)

Code	Title	Credits
Major Field Courses		
<u>600 Level Courses in Major Field</u>		<u>18</u>
<u>HIST 622</u>	Culture and Science in the History of American Medicine	3
<u>HIST 628</u>	Gender, Science and Technology in the Modern World	3
<u>HIST 632</u>	Global Hist of Tech & Culture	3
<u>HIST 634</u>	Environmental History of North America	3
<u>HIST 635</u>	History of Technology, Environment and Medicine: Theory and Method	3
<u>HIST 656</u>	Topics in the History of Health	3
Minor Field Courses <u>Courses Outside the Major Field</u>		
Two 600 or 700 level courses in either American History or World History <u>outside the major field</u>		6
Elective Courses		
One 600 or 700 level course		3
Essay		
<u>HIST 702</u>	Master's Essay	3
Total Credits		30
Course List		

Motion approved by the CGE on April 4

Create a 0-credit Responsible Conduct of Research (RCR) course that all Ph.D. students must take in the first year of their studies. MS thesis and MS project students must take the course as soon as they register in thesis or project. Graduate programs may request an exception by indicating the reasons (primarily for joint PhD programs already requiring a relevant course).

M.S. in Cyber Security and Privacy

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 project or thesis must be related to cyber security.

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):

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

Course List

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

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 or ECE 637	Internet and Higher-Layer Protocols ¹ Internet and Higher-Layer Protocols	3
CS 696 or ECE 638	Network Management and Security ¹ Network Management and Security	3

Code	Title	Credits
Electives and Foundation Courses		12
Electives		
CS 633	Distributed Systems	
CS 634	Data Mining	
CS 643	Cloud Computing	
CS 660	Digital Watermarking	
CS 673	Software Design and Production Methodology	
CS 678	Smartphone Security and Reliability	
CS 680	Linux Kernel Programming	
CS 684	Software Test & Qual Assurance	
CS 708	Advanced Data Security and Privacy	
CS 755	Security and Privacy in Wireless Networks	
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	
Foundational Courses		
CS 610	Data Structures and Algorithms	
CS 630	Operating System Design	
CS 631	Data Management System Design	
Total Credits		30

Course List

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 project option)

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

Code	Title	Credits
CS 647	Counter Hacking Techniques	3
CS 656 or ECE 637	Internet and Higher-Layer Protocols Internet and Higher-Layer Protocols	3
CS 696 or ECE 638	Network Management and Security Network Management and Security	3
Project		
CS 700B	Master's Project ¹	3
Electives and Foundation Courses		9
Electives		
CS 633	Distributed Systems	
CS 634	Data Mining	
CS 643	Cloud Computing	
CS 660	Digital Watermarking	
CS 673	Software Design and Production Methodology	
CS 678	Smartphone Security and Reliability	
CS 680	Linux Kernel Programming	
CS 684	Software Test & Qual Assurance	
CS 708	Advanced Data Security and Privacy	
CS 755 or ECE 782	Security and Privacy in Wireless Networks	
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	
Foundational Courses		
CS 610	Data Structures and Algorithms	
CS 630	Operating System Design	
CS 631	Data Management System Design	
Total Credits		30
Course List		

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)

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 660	Digital Watermarking	
CS 673	Software Design and Production Methodology	
CS 678	<i>Smartphone Security and Reliability</i>	
CS 680	Linux Kernel Programming	
CS 684	<i>Software Test & Qual Assurance</i>	
CS 708	Advanced Data Security and Privacy	
CS 755	Security and Privacy in Wireless Networks	
or ECE 782		
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	

Code	Title	Credits
MGMT 691	Legal and Ethical Issues	
Foundational Courses		
CS 610	Data Structures and Algorithms	
CS 630	Operating System Design	
CS 631	Data Management System Design	
Total Credits		30

Course List

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.

Commented [MOU1]: UPDATED TEXT

Code	Title	Credits
Core Course Requirements:		21
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

Code	Title	Credits
CS 696	Network Management and Security	3
YWCC 691	Graduate Capstone Project	3

Commented [MOU2]: NEW TEXT

PTC (Professional and Technical Communications) Courses

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	
PTC 628	Analyzing Social Networks	
PTC 629	Theory and Practice of Social Media	
PTC 632	Content Management and Information Architecture	

Management Courses

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

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 660	Digital Watermarking	
CS 673	Software Design and Production Methodology	
CS 700B	Master's Project	
CS 678	Smartphone Security and Reliability	
CS 684	Software Test & Qual Assurance	
CS 708	Advanced Data Security and Privacy	
CS 755	Security and Privacy in Wireless Networks	

or ECE 782

Code	Title	Credits
<u>IS 680</u>	Information Systems Auditing	
<u>IS 681</u>	Computer Security Auditing	
<u>IS 682</u>	Forensic Auditing for Computing Security	
<u>IT 620</u>	Wireless Networks Security and Administration	
<u>IT 640</u>	Network Services Administration	
<u>ECE 636</u>	Computer Networking Laboratory	

Ph.D. in Mathematical Sciences

Degree Requirements

Ph.D. students are admitted to the applied mathematics track or the applied statistics and probability track. In either track, students must fulfill the requirements for the doctor of philosophy as specified in this catalog. Students entering with a bachelor's degree must complete 36 credits of coursework. Those students entering with a master's degree in mathematical sciences or equivalent must complete 12 credits of advanced 700-level coursework. Specific courses of study are planned in consultation with a faculty advisor and are subject to approval. In general, students are encouraged to take courses both in mathematics and in areas of application. To graduate, students must have an approved dissertation and are expected to attain an overall GPA of at least 3.0.

Seminar: In addition to the minimum degree credits required, all doctoral students must enroll each semester in [MATH 791](#) Graduate Seminar.

Ph.D. in Mathematical Sciences (students with a Master's degree in Mathematical Sciences or equivalent)

Code	Title	Credits
Electives		
700-level courses ¹		12
Dissertation		
MATH 790 Doct Dissertation & Res ²		
MATH 792 Pre-Doct Dissertation & Res ²		
Seminar		
MATH 791	Graduate Seminar ³	0
Total Course Credits		12
Course List		

¹ No more than 6 credits may be [MATH 725](#) Independent Study. 700-level courses may be substituted by 600-level courses if the academic advisor appeals on behalf of the student to the Office of Graduate Studies and receives approval. Whether or not a program requires additional courses above the aforementioned minimum requirements, a Ph.D. student's dissertation committee may ask the student to take additional courses.

² Ph.D. students who pass the written and oral qualifying examination must then register for the 1-credit dissertation course ([MATH 790](#) Doct Dissertation & Res) each semester until they complete all degree requirements. Students may take courses simultaneously with the 790 or 792 (Pre Doctoral Research) course as per Ph.D. program guidelines or dissertation committee recommendation.

³ Students must register eight semesters for this seminar. Part-time students may request that this requirement be waived for some semesters.

Ph.D. in Mathematical Sciences (students with a Bachelor's degree in Mathematical Sciences or equivalent)

Code	Title	Credits
Electives		
600 and 700-level courses ¹		36
Dissertation		
Math 790	Doct Dissertation & Res ²	
Math 792	Pre-Doct Dissertation & Res ²	
Seminar		
MATH 791	Graduate Seminar ³	0
Total Course Credits		36
Course List		

¹ 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 as well as four additional 700-level 3-credit courses (12 credits), for a total of twelve 3-credit courses (36 credits). No more than 6 credits may be [MATH 725](#) Independent Study. 700-level courses may be substituted by 600-level courses if the academic advisor appeals on behalf of the student to the Office of Graduate Studies and receives approval. Whether or not a program requires additional courses above the aforementioned minimum requirements, a Ph.D. student's dissertation committee may ask the student to take additional courses.

² Ph.D. students who pass the written and oral qualifying examination must then register for the 1-credit dissertation course ([MATH 790](#) Doct Dissertation & Res) each semester until they complete all degree requirements. Students may take courses simultaneously with the 790 or 792 course (Pre Doctoral Research) as per Ph.D. program guidelines or dissertation committee recommendation. Students must register eight semesters for this seminar. Part-time students may request that this requirement be waived for some semesters.

Courses: A typical schedule of courses for the first two semesters in Applied Mathematics consists of the following:

Semester I		Credits
MATH 599	Teaching in Mathematics	3
MATH 613	Advanced Applied Mathematics I: Modeling ¹	3
MATH 631	Linear Algebra ²	3
MATH 645	Analysis I ³	3
MATH 651	Methods of Applied Mathematics I ¹	3
Term Credits		15
Semester II		
MATH 614	Numerical Methods I ²	3
MATH 656	Complex Variables I ³	3
MATH 689	Advanced Applied Mathematics II: Ordinary Differential Equations	3
MATH 745	Analysis II ³	3

Courses: A typical schedule of courses for the first two semesters in Applied Probability and Statistics consists of the following:

Semester I		Credits
MATH 599	Teaching in Mathematics	3
MATH 631	Linear Algebra	3
MATH 644	Regression Analysis Methods ¹	3
MATH 645	Analysis I ²	3
MATH 662	Probability Distributions ¹	3
Term Credits		15
Semester II		Credits
MATH 665	Statistical Inference ²	3
MATH 699	Design and Analysis of Experiments ³	3
MATH 745	Analysis II ²	3
MATH 768	Probability Theory ³	3
Term Credits		12

Also, there are advanced courses in:

- partial differential equations
- ordinary differential equations and dynamical systems
- optimization
- numerical methods
- computational electromagnetics
- computational fluid dynamics
- computational neuroscience
- financial mathematics
- integral equations
- materials science
- probability and statistics

Deadlines

- The required coursework for the Ph.D. program and the major part of the qualifying exams must be completed successfully by the end of the second year in the program. The written exams are typically completed by the end of the first summer, and the oral exam by the end of the second year.
- The dissertation proposal must be defended successfully either by the end of the third year in the Ph.D. program.

- The dissertation must be defended successfully by the end of the sixth year in the Ph.D. program.

Selection of Dissertation Advisor

Students select a dissertation topic and advisor in the second year of the program. In cases where more than one advisor is directing the dissertation, the primary advisor must be on the core departmental faculty.

Qualifying Examination

Applied Mathematics track: The qualifying examination for the applied mathematics track consists of a preliminary examination in three parts and an oral examination. The three components of the preliminary examination are: Applied Mathematics, Analysis, and Linear Algebra-Numerical Methods. Students must achieve a grade of A in each component to pass the preliminary examination and proceed to the oral examination. Components may be passed at different times. However, a student may attempt each component at most twice and must pass all three components before taking the oral examination. The qualifying examination must be passed by the end of the second year in the program. Typically, two opportunities to take each component are provided each year: Applied Mathematics (January and May), Analysis and Linear Algebra-Numerical Methods (May and August). The oral examination is usually offered in January and May. The oral exam is intended to test the students research readiness. Exam topics are chosen in consultation with the Ph.D. advisor, and include research papers and coursework relevant to the dissertation topic.

Applied Probability and Statistics track: The qualifying examination for the applied probability and statistics track consists of a preliminary examination in three parts and an oral examination. The three components of the preliminary examination are: Probability Distributions and Regression Analysis Methods, Real Analysis and Statistical Inference, Probability Theory and Design and Analysis of Experiments. Students must achieve a grade of A in each component to pass the preliminary examination and proceed to the oral examination. Components may be passed at different times. However, a student may attempt each component at most twice and must pass all three components before taking the oral examination. The qualifying examination must be passed by the end of the second year in the program. Typically, two opportunities to take each component are provided each year: Probability Distributions and Regression Analysis Methods (January and May), Real Analysis and Statistical Inference and Probability Theory and Design and Analysis of Experiments (May and August). The oral examination is usually offered in January and May. The oral exam is intended to test the students research readiness. Exam topics are chosen in consultation with the Ph.D. advisor, and include research papers and coursework relevant to the dissertation topic.

Dissertation Committee

The dissertation committee is an important resource for the doctoral student in the conduct of research for their dissertation. According to the regulations specified in this catalog, doctoral

students are required to have a dissertation advisor selected, a dissertation committee formed, and research proposal approved within one year of passage of the qualifying examination.

Dissertation Proposal

Doctoral students must prepare a research proposal for approval by their dissertation committee. The student must offer an oral defense of this proposal before the dissertation committee and obtain its approval within one year of passing the qualifying examination. The committee determines if the proposal has an appropriate objective, if there is a reasonable plan to reach that objective, and if the student possesses the knowledge and skills needed to carry out the plan. The dissertation proposal can only be approved by unanimous consent of the committee members.

Dissertation Defense

A public oral defense of the dissertation before the dissertation committee is required. All members of the committee must be present for the defense. Success of the defense is determined by a majority vote of the dissertation committee.