Northwestern | OFFICE OF THE REGISTRAR

New Course and Course Revision Form

Requests for new courses and revisions to existing courses can be submitted through this form. Any requests will be routed to the appropriate approvers for review.

Contact Information

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Form Type

Is this request for a new course or a revision to an existing course?

- (●) New Course
- ( ) Course Revision
- ( ) Course Deactivation

Course Effective Dating

Course Approval By: McCormick School of Engineering and Applied Science

Quarter Effective: Fall

Year Effective: 2026

Should this class be included in the next catalog release (8/1)?

- (●) Yes
- ( ) No

Has a section of this course already been scheduled in CAESAR for the effective term?

- ( ) Yes
- ( ) No

Basic Course Information

Subject Code

IEMS

Catalog Number

314-0

Routing Number

314

Academic Career

TGS – The Graduate School

Short Title

Nonlinear Opt. for Decisions

Long Title

Nonlinear Optimization for Decision Making

Catalog Description

Theory and algorithms of nonlinear optimization as a bridge between deterministic linear models and data-driven decision making under uncertainty. This course covers convex and nonconvex modeling, first- and second-order optimality conditions, duality theory, and numerical methods including gradient-based, stochastic, Newton-type, and constrained optimization algorithms. Case studies from machine learning, finance, and engineering motivate the formulation and analysis of real-world nonlinear models. Students implement foundational solvers from first principles, construct more advanced solvers using generative-AI–assisted development, and deploy these methods on applications such as nonlinear regression and classification, portfolio optimization, and parameter estimation in complex systems.

Does this course have prerequisites and/or corequisites?

- [x] Prerequisites
- [ ] Corequisites

Should this requisite be enforced?

- (●) Yes
- ( ) No

Prerequisite and/or Corequisite Description

GEN_ENG 150 or COMP_SCI 150
GEN_ENG 231
GEN_ENG 241
MATH 228-1;
or equivalent

Minimum Units

1

Maximum Units

1

Grading Basis: 0 Credit Hours

Grading Basis: >0 Units

ABC - Letter Grade Only

Grading Basis: 0-1+

Is this course taught with or equivalent to any courses that currently exist or will be created in the catalog?

- (●) No
- ( ) Taught With
- ( ) Equivalent To

No – This course is dissimilar enough to all other courses so that they should not reference other courses in the course catalog. (Example: STAT 210-0 and PSYCH 201-0.)

Taught With – This course is considered the same course as and is typically offered as a combined section with another course. Courses in this category would share a Course ID, Title, Description, Units, Grading Basis, Attributes, and Topics. They can have distinct Subject Areas, Catalog Numbers, and Catalog/Class Requirements. They can be scheduled individually, but must be combined in CLSS each quarter they are offered together. (Example: LEGAL_ST 206-0 and SOCIOL 206-0.)

Equivalent To – This course's content is similar enough to another course that students should not be able to take and receive credit for both. These courses are never taught together and are separately scheduled courses, but share content that may overlap with other courses offered in the catalog. Courses in this category would be placed in an Equivalency Group, so that they count towards each other's repeat limits, and registration would generally be limited to one enrollment. (Example: STAT 202-0 and STAT 210-0.)

Repeat Rules

Can this course be repeated for credit?

- ( ) Yes
- (●) No

Allow multiple enrollments within a term?

- ( ) Yes
- (●) No

Number of Completions Allowed

WCAS Foundational Disciplines and Overlays

Foundational Disciplines

- ( ) Natural Sciences
- ( ) Empirical and Deductive Reasoning
- ( ) Social and Behavioral Sciences
- ( ) Historical Studies
- ( ) Ethical and Evaluative Thinking
- ( ) Literature and Arts
- ( ) Not Applicable

United States and Global Overlays

- ( ) United States Perspectives

- ○ Global Perspectives
- ○ Not Applicable

Advanced Expression

- ○ Yes
- ○ Not Applicable

Additional Course Information

Add Consent

- ● No Consent
- ○ Department Consent
- ○ Instructor Consent

Course Attributes

Not Applicable

Default Campus

Evanston

Course Typically Offered

- ☐ Fall
- ☑ Winter
- ☑ Spring
- ☐ Summer

Primary Component

Lecture

Secondary Component

Lab

Default Capacity

50

Final Exam held during finals week?

Yes

Additional Information/Requested Changes

Approval 1

Comments

By clicking the button below, you consent to the use of digital signatures.

Approval 2

Comments

By clicking the button below, you consent to the use of digital signatures.

Distro Approval

Comments

By clicking the button below, you consent to the use of digital signatures.