# DOCTOR OF PHILOSOPHY IN MANAGEMENT SCIENCE

Stuart's Ph.D. in Management Science offers comprehensive coverage on the application of quantitative methods, analytical tools, and computer models to decision-making problems in business, finance, and operations management.

## Program Goals

This program prepares students and working professionals for careers in academia as well as executive and management positions in business, government, and consulting sectors. The Ph.D. program emphasizes both analysis and synthesis. The required courses provide the tools to analyze business problems and to develop new systems or new solutions. Once students master these skills, their dissertation work involves structuring a problem, gathering data where appropriate, and solving it. The research methodologies of management science can be applied to any aspect of business. The program's goal is to facilitate the contribution of new knowledge to the field of business through applied research that addresses important problems in operations and finance.

## Admission Requirements

Applicants to the Ph.D. in Management Science must have a competitive score on the GMAT or GRE (316 or above for GRE and 650 or above for GMAT).

The following are additional requirements for each of the three tracks within the Ph.D. in Management Science:

1. M-track with Finance concentration: a graduate degree considered equivalent to the M.S. in Finance degree offered at the Stuart School
2. M-track with Analytics concentration: a graduate degree considered equivalent to the M.S. in Marketing Analytics degree offered at the Stuart School
3. UG-track with Finance or Analytics concentrations: an undergraduate degree with an outstanding record of academic accomplishments

## Curriculum

Applicants to the Ph.D. program must have completed a master's degree with a graduate level business core, or a master's in finance or equivalent degree. For applicants who have a master's degree but have not completed the business core, some prerequisite courses will be required.

This program is selective and small with a high degree of interaction between faculty and students, and a mentor relationship with a faculty adviser. The Ph.D. committee carefully matches the interest of the student with the expertise of the faculty member. The program offers two concentrations: analytics and finance.

In order to earn a Ph.D. in Management Science, students are required to complete a total of 60 credit hours beyond the master's degree, with 24 credit hours devoted to dissertation research work. Students are required to complete twelve courses in the first two years, including eight Ph.D. core courses and four advanced elective courses in the chosen area of concentration (analytics or finance). In the third and fourth year of study, students enroll in four adviser-approved open electives, in addition to registering for dissertation credits to pursue and complete the doctoral dissertation.

### Analytics Concentration

The Ph.D. program with a concentration in Analytics is well positioned in terms of opportunities for graduates in the career marketplace. Graduates can pursue career options ranging from traditional academia (teaching in schools offering programs focused on analytics) to positions in consulting, industry, and government that require expertise in business analytics, predictive modeling, and management of big data. The program offers opportunities to develop specialized skills involving analytics in fields such as marketing, networks, and supply chain management.

### Finance Concentration

Graduates of the Ph.D. program with a concentration in Finance have a wide choice of careers. In addition to a traditional academic career focused on teaching and research, graduates may also work in investment and commercial banking, trading, and risk management. Dissertation research in this area may include a wide range of topics such as risk modeling, financial time series analysis, and investment analysis.

## Doctor of Philosophy in Management Science - M-Track (for students with a prior master's degree)

In the first year, full-time students will complete the Ph.D. basic core (a six-course sequence of two courses each in economics, statistics, and optimization areas), before taking the qualifying exam. The qualifying exam must be taken after completing the six basic core courses, and the qualifying exam may only be taken once.

In the second year, full-time students will complete the Ph.D. advanced core (a six-course sequence consisting of two Ph.D. advanced core courses and four specialization-specific courses as shown below). After completing all required Ph.D. coursework, usually at the end of the second year of full-time study, a written comprehensive examination is required. This examination is a rigorous review of the level of competency achieved as a result of the entire program of graduate study. The comprehensive exam may be taken only twice.

In the third and fourth year of graduate study, students will take four adviser approved elective courses (or 12 credit hours) and enroll for 24 dissertation credit hours.

| **Basic Core Requirements** | | **(18)** |
|---|---|---|
| MSC 511 | Economics I | 3 |
| MSC 512 | Statistics I | 3 |
| MSC 513 | Optimization I | 3 |
| MSC 514 | Economics II | 3 |
| MSC 515 | Statistics II | 3 |
| MSC 516 | Optimization II | 3 |
| HUM 601 | Teaching Assistant Seminar | 0 |
| **Advanced Core Requirements** | | **(18)** |
| MSC 611 | Philosophy of Management | 3 |
| MSC 612 | Advanced Research Methods | 3 |
| Specialization courses (see Specializations tab for required courses) | | 12 |
| **Ph.D. Research** | | **(24)** |
| MSC 691 | Research and Thesis PhD | 24 |
| Total Credit Hours | | 60 |

## Doctor of Philosophy in Management Science - UG-Track (for students with an undergraduate degree only)

In the first year, full-time students will complete the Ph.D. basic core (a six-course sequence of two courses each in economics, statistics, and optimization areas) before taking the qualifying exam. The qualifying exam must be taken after completing the six basic core courses, and the qualifying exam may only be taken once.

In the second year, full-time students will complete the Ph.D. advanced core (a six-course sequence consisting of two Ph.D. advanced core courses and four specialization-specific courses as shown below). After completing all required Ph.D. coursework, usually at the end of the second year of full-time study, a written comprehensive examination is required. This examination is a rigorous review of the level of competency achieved as a result of the entire program of graduate study. The comprehensive exam may be taken only twice.

In the third and fourth year of graduate study, students will take four adviser approved elective courses (or 12 credit hours) and enroll for 24 dissertation credit hours.

| **Basic Core Requirements** | | **(18)** |
|---|---|---|
| MSC 511 | Economics I | 3 |
| MSC 512 | Statistics I | 3 |
| MSC 513 | Optimization I | 3 |
| MSC 514 | Economics II | 3 |
| MSC 515 | Statistics II | 3 |
| MSC 516 | Optimization II | 3 |
| HUM 601 | Teaching Assistant Seminar | 0 |
| **Advanced Core Requirements** | | **(18)** |
| MSC 611 | Philosophy of Management | 3 |
| MSC 612 | Advanced Research Methods | 3 |
| Specialization courses (see Specializations tab for required courses) | | 12 |
| **Ph.D. Research** | | **(24)** |
| MSC 691 | Research and Thesis PhD | 24 |
| **Elective Courses** | | **(18)** |

| | | |
|---|---|---|
| Select 18 hours of adviser-approved elective courses | | 18 |
| Total Credit Hours | | 78 |

## Program of Study

Stuart requires that at least two semesters of study be completed on a full-time basis. The semesters need not be consecutive, but must occur within the six years prior to the awarding of the degree. After completion of coursework and qualifying/comprehensive exam requirements, the dissertation research may be done off campus if suitable arrangements for supervision are made.

When a student is ready to begin dissertation research work, the Dean of the Stuart School will appoint a mutually acceptable research adviser to supervise the student's research. The student will work with the adviser to constitute a dissertation committee (composed of at least four full time faculty members including the adviser, one of whom will be a representative from outside the student's field) before beginning work on a dissertation project that must be an original investigation of high quality. Students are required to defend a dissertation proposal before the dissertation committee. After the dissertation project is completed, the student will appear before the dissertation committee to defend the dissertation project. Usually, the dissertation proposal defense and the dissertation defense are at least one year apart.

Students may take up to six years to complete the degree. After six years, students may petition for an extension, but they must reapply to the program and may be required to retake a comprehensive examination. A cumulative GPA of 3.0/4.0 in an approved program of study is a requirement for the Ph.D. program.

Students entering the program may transfer up to two courses from a graduate program at another AACSB-accredited university if the student has not used the courses to satisfy the requirements for a degree at the university. Additional courses may be transferred with the permission of the program director.

Some students may be required to take prerequisite courses in mathematics, statistics, or computer programming before being admitted to a graduate course. Undergraduate course offerings, which typically are listed with a primary numeral of four or below, cannot be used as free electives in the Ph.D. program.

# Analytics Specialization

| **Required Courses** | | **(12)** |
|---|---|---|
| MSC 651 | Quantitative Marketing Models | 3 |
| MSC 652 | Supply Chain Analytics | 3 |
| MSC 653 | Current Topics in Marketing Analytics | 3 |
| MSC 654 | Social Network Analytics | 3 |
| Total Credit Hours | | 12 |

# Finance Specialization

| **Required Courses** | | **(12)** |
|---|---|---|
| MSC 621 | Corporate Finance | 3 |
| MSC 623 | Investments | 3 |
| MSC 631 | Theory of Finance I | 3 |
| MSC 633 | Theory of Finance II | 3 |
| Total Credit Hours | | 12 |