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# IPD

INTEGRATED PRODUCT DESIGN

*UNIVERSITY OF PENNSYLVANIA*

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## **Guidelines for Graduate Study**

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***\*Theses guidelines are subject to change.***

## 1. INTRODUCTION

As the market grows, it is becoming apparent how influential the design of the product is on its use, manufacture, and appeal to the consumer. A consumer might buy a certain type of cell phone simply because of its look, feel, and weight – ultimately, its design. As priorities have shifted toward product design, it is also becoming increasingly important to develop professionals who understand the nuances of the business, artistic and engineering aspects of design and be able to communicate with experts in those fields. The integrated product designer must be knowledgeable in manufacturing, technical design, human interfaces, ergonomics, marketing, finance, as well as the aesthetic aspects of design, form and function. As such, in addition to engineering and business development, this program emphasizes creativity, risk-taking, aesthetic appropriateness, and interdisciplinary interaction and co-operation.

The information presented here is not exhaustive; students should also obtain information from the following publications (can be obtained from 111 Towne Building; when in print):

- Current University of Pennsylvania catalog “Graduate Study in Engineering and Applied Science.”
- “The PennBook - Resources, Policies & Procedures Handbook,” which contains University policies and procedures.
- “An Insider’s Guide to Graduate Requirements,” published by the Office of Graduate Education and Research in the School of Engineering and Applied Science (SEAS).
- “The Practical Penn: A Student Guide” a very informative handbook distributed to all new students.

More information, updated periodically, on the I.P.D. program is also available on the website, [www.me.upenn.edu/ipd](http://www.me.upenn.edu/ipd). Reading all of the rules and procedures is essential in order to be familiar with various degree requirements and the plentiful opportunities that are available. These guidelines together with the above publications will answer most of your questions. Advice and answers to special questions may be obtained from your advisor or the Director<sup>1</sup>, Associate Director<sup>2</sup>, as well as the Graduate Program Coordinator<sup>3</sup> who will assist you in any reasonable manner possible.

## 2. ADVISOR

The first person with whom a new student has contact is an assigned academic advisor. A program of study is developed with the academic advisor. Later on, if necessary, the student may request a change of advisor, which will be considered and approved by the Director as appropriate. The academic advisor is responsible for monitoring the student's academic plan and a separate thesis advisor will be responsible for monitoring the I.P.D. Research Studio Project Thesis work.

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### 3. DEGREE REQUIREMENTS

To achieve a Master of Science in Engineering, Integrated Product Design, the M.S.E. requirements consist of a total of ten courses, including a Master's Research Studio Project Thesis. Since this program is cross-disciplinary students who do not have the requisite background in the three areas, Engineering, Design Arts, Marketing/finance, may need to enroll in background courses.

#### **Background Courses** (0-3 CUs or show proficiency in)

Engineering Basics	MEAM 101 Introduction to CAD/CAM or MEAM 150 Fundamentals of Mechanical Prototyping or equivalent
Design Art Basics	IPD 403 / ARCH 403 Design Fundamentals (or equivalent)
Marketing/Finance	EAS 445 Engineering Entrepreneurship I or MKTG 101 Introduction to Marketing

<b>Core Courses</b> (2 CUs)	IPD 511 Visual Thinking/Prototyping (1 CU) IPD 515 (MEAM 515/OPIM 515) Product Design (1 CU)
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#### **Breadth** (1 CU in each Breadth area below)

<u>Engineering Breadth</u>	MEAM 510 Design of Mechatronic Systems (1 CU) or IPD 514 Design for Manufacturability (MEAM 514) (1 CU)
<u>Design Arts Breadth</u>	IPD 528 Industrial Design II (ARCH 728) (1 CU), IPD 526 Furniture Design (ARCH 726) (1 CU), IPD 527 Industrial Design (ARCH 727) (1 CU), IPD 532 Architectural Surface Effects (ARCH 632) (1 CU) or IPD 544 Digital fabrication in architecture (ARCH 744)
<u>Business Breadth</u>	MKTG 756 Marketing Research (1 CU) or MKTG 776 Applied Probability Models in Marketing OPIM 662 Enabling Technologies or OPIM 656 Operations Strategy and Process Management (1 CU)

**Depth** (1 CU) A second course in one of the three breadth areas

**Elective** (1 CU) One graduate course in Engineering, Design, or Business schools

IPD 699 **Integrated Product Design Seminar** (0 CU; 2 semesters)

IPD 799 **Master's Research Studio Project Thesis** (3 CUs)

\* If a course is crosslisted students must register for the IPD section when available

\*\* Prior to the fall of 2008 ARCH727 / MEAM 512 Design Arts Basics was a background course and could not be taken for credit in fulfillment of the degree requirements.

\*\*\* Any deviation from the above must be approved by your advisor and the Director.

#### **4. ATTENDANCE AT DEPARTMENTAL SEMINARS AND THESIS PRESENTATIONS**

The attendance of all full-time graduate students at IPD seminars is mandatory. There are many good reasons why students should attend departmental seminars even when the seminars are not directly linked to their areas of research. For example:

- The seminar provides an opportunity to learn about the state-of-the-art in mechanical engineering and applied mechanics.
- The seminar provides an opportunity for the student to get acquainted with people from other institutions and companies and get an inside view of the culture at other institutions. On more than one occasion, during job interviews, interviewers have been known to mention a visit to Penn and delivering a seminar. The student would like to be in a position to comment on that particular seminar and state how enjoyable it was.
- The seminars are an excellent opportunity to get together as a department. It is hoped that a full attendance at these seminars will help create departmental spirit and cohesiveness.

##### Seminar Course

The seminar course has been established so that students are recognized for their seminar attendance as well as to encourage students to attend. There are no quizzes, tests, or homeworks. The course is graded S/U. In order to obtain a satisfactory (S) grade, the student must attend the IPD seminars. In order to obtain their degree, M.S.E. students will be required to accumulate 2 seminar course. Under special circumstances, e.g., in a case of a conflict with a course offering, the student may waive the seminar requirement for the particular semester by petitioning to the Director. Part-time students are exempted from the seminar attendance requirement although they are encouraged to attend the seminars.

#### **5. GENERAL INFORMATION**

##### Registration:

All students enrolled in a degree program are required to be continuously registered. Three courses per semester (including studio project research, such as IPD 799 and independent studies) is considered to be a normal full-time load for all students. Students in the I.P.D. M.S.E. program may take up to five courses in a semester if they are in excellent academic standing (with a G.P.A. of 3.5 or better). Approval from the program Director or academic advisor is necessary if the student wants to take more than four courses in their first semester. Students must always consult with the Director if a deviation from the normal load is being contemplated or desired. Part-time students usually take one or, at most, two courses per semester.

IPD 799 is the course assigned to studio thesis research. The grading of IPD 799 is done by the student's thesis project advisor. Students must complete an advisor's sign-off form. This form may be found in Appendix A and should be submitted prior to registering for courses.

##### Leaves of Absence:

Continuous registration as a graduate student is required unless a formal leave of absence is granted by the Dean of the student's school. A student who has reached dissertation tuition status will not be granted a leave of absence, except for military duty, medical reasons, or when a student receives a grant for dissertation research abroad and the grant does not include funds to pay home institution fees. A student not in dissertation status who desires a leave of absence must submit a request to the Director and to the Graduate Division Office.

Obsolescence:

The maximum time allowed for the completion of all M.S.E. requirements is seven years. Course units that are older than seven years may not be counted toward the degree requirements.

Changes in Course Program:

Students may add or drop courses without penalty during a semester if it is done by the deadline listed in the current graduate bulletin. The student's advisor must be informed of the student's decision beforehand and must receive his/her approval.

Grades, Credits, and Academic Standing:

The grading system is as follows: A (4.0), Excellent; B (3.0), Good; C (2.0), Fair; D (1.0), Poor; F (0.0), Failure. A course in which an F was obtained must be taken again; however, the F will remain on the student's transcript. Courses for which a passing grade was obtained cannot be retaken for credit.

An incomplete (I) or a no report (NR) are temporary notations and students are allowed a period of one semester to clear them from their transcripts. Failure to clear an "incomplete" or "no report" within the allotted time will result in an automatic grade of F. *No students will be permitted to graduate if there are any Incomplete, Unsatisfactory, or No Report notations on their records.*

M.S.E. Students in the School of Engineering are expected to maintain at least a B- average (2.7) in their work. A student whose record falls below a B- average will be put on academic probation and may be required to withdraw; graduation requires a minimum of a B- average.

## **6. INDEPENDENT STUDY**

Independent study courses are important vehicles to accommodate special interests of the students, which are not served through the regular courses. They create opportunities for mini-projects and a mentoring relationship between the student and the faculty. Independent study can also serve as a means for the student and advisor to appreciate each other's interests and get started on dissertation work prior to making a long-term commitment. The student should identify the topic and scope of the independent study in the semester prior to the one in which s/he intends to take the independent study.

Since independent studies are less structured than regular courses and typically do not come with strict deadlines, occasionally students tend to fall behind in their work. There is also the possibility of miscommunication between the student and the faculty on the objectives, extent, scope, and the grading method for the independent study.

The purpose of this policy is to set the rules for an independent study with the objectives of maintaining academic rigor and minimizing any potential for miscommunication.

- An independent study course should require effort comparable to that of a regular course, about 9 hours a week or a total of 126 hours per semester.
- The student should meet the faculty member administering the independent study (the advisor) on a regular basis, at least once a week. It is the student's responsibility to schedule these weekly meetings. Past experience indicates that failure to maintain regular contact with the student's advisor can lead to a less than satisfactory performance in the independent-study course. In the absence of regular contact, the student stands the risk of not being focused leading to an impression of dereliction. The key to a successful independent study is a steady effort throughout the semester. The student should not expect to be able to cram a semester's work into a few days of intensive work at the end of the semester.
- Prior to the beginning of the semester in which the student contemplates taking the independent study, the student and his/her advisor should develop a brief document. The first paragraph of the document should describe the objectives, scope, and content of the independent study. The second paragraph should state how the independent study will be evaluated and how the student will be graded. The document should be signed by both the student and his/her advisor, and it should be submitted to the program Director for approval before the beginning of the semester.
- At the conclusion of the independent study, the student should prepare a brief report specifying what material was covered during the independent study, those objectives that were met and those that were not. In the event that objectives were not met, a clear explanation should be provided as to why such objectives were not met. This document should also be signed by the student and his/her advisor, and it will be included in the student's file.
- It is the student's responsibility to make sure that these guidelines are followed. Failure to follow these guidelines may result in the student not receiving credit for the independent study.

## **7. POLICY ON TRANSFER OF CREDIT UNITS EARNED IN OTHER INSTITUTIONS**

M.S.E. students may obtain credit for up to two courses taken at another institution. These courses are referred to as transfer courses. Transfer courses must be graduate level courses in which at least a B grade has been earned. Transfer credit will only be considered for courses taken prior to matriculation in the graduate program in the Department of Mechanical Engineering and Applied Mechanics. To obtain credit for courses taken at other institutions, the following procedure must be followed:

- For each transfer course, obtain the course description and the title of the textbook prescribed for the course.
- Identify a professor who teaches a similar course at Penn. If a similar course is not offered at Penn, identify a professor whose areas of expertise are in the general area of the course to be transferred. The professor should certify that the course is of similar level to a graduate course offered at Penn or, if a similar course is not offered at Penn, that the course qualifies for Penn students to take if it were offered here.
- Submit a petition on a standard form (<http://www.seas.upenn.edu/forms/documents/g-transfer-credit.pdf>) to the program Director. Attach to the petition a copy of the transcript, the professor's certification, and documents and information noted on the standard form.

## **8. MASTER'S RESEARCH STUDIO PROJECT THESIS**

The Master's Research Studio Project Thesis is a 3CU project (expected to be achieved in 3 consecutive semesters). Students will register for one unit of IPD 799 in the semester in which they are working on the project.

The project is an opportunity to manifest a synthesis of art and technology and to push the envelope of design possibility in the context of user need and market forces. The project will involve the development of a product from concept, user need, marketing analysis, design implementation to prototype and feasibility testing.

The thesis project is supervised by a faculty member in SEAS, Wharton, or Design, or an external sponsor with approval by the program Director. Attendance and participation in seminars, discussions and student presentations will be part of the thesis project grade.

Before the middle of the first semester of research students must submit a written proposal to their Advisor outlining their studio research project. The proposal should typically contain a statement of the objective of the work, a pertinent state-of-the-art review, the scope of the studies, and an outline of the proposed final product. The Advisor will evaluate the proposal and make recommendations on how it can be improved. The Advisor, in consultation with the Director, will then appoint a MSE Studio Research Project Advisory committee. This committee will include one member from Engineering, one from Design, and one from Business (including their advisor). It is the student's responsibility to seek a consultation from the members of the committee during the three semesters of research. These consultation sessions are intended to be helpful in discussing the student's thesis project proposal and to ensure that the interdisciplinary requirement all areas of this program are fulfilled. The student is also encouraged to frequently consult with the Committee members and inform them of the progress.

At the end of the student second semester of research and analysis, is the design, detail development of the final thesis project.

At the end of the students third semester of research a public presentation of the work is then made; after this presentation, the Committee will give final approval or disapproval. When final approval of the thesis is obtained, an electronic copy of the thesis must be submitted to the Director.

All studio thesis projects must be freely publishable and the contents cannot be restricted from dissemination to the community at large by the candidate's place of employment or the sponsoring agency, government, or any person. Any computer source code which constitutes a portion of the thesis (with the exception of readily-available commercial software) must be available to the community at large. It is the responsibility of the student to insure that the above requirements are duly considered in the planning and execution of the research program and in the presentation of the final document.

## **9. SUBMATRICULATION**

Outstanding undergraduate students at the university may submatriculate in the M.S.E. degree program and take graduate-level courses as electives during their junior and senior years. After fulfilling the requirements of both programs, the student will receive a B.S.E. and a M.S.E. degree. Undergraduates at the University of Pennsylvania may double-count up to two graduate-level courses taken while enrolled as a submatriculant towards both the undergraduate and the graduate degree. The M.S.E. degree may be completed in two extra semesters of study. In order

to complete both degrees in only five years, students can consider:

- Independent study courses in the summer of the fourth year.
- Taking the background courses during the undergraduate program.
- Take extra graduate-level courses (cannot be counted towards the B.S.E. degree) during the undergraduate program.

Applications to the program must be completed by the end of the junior year. Submatriculation applications are available in the Office of Graduate Admissions (111 Towne Building).

## **10. DUAL DEGREE PROGRAMS**

Students may enroll in a dual degree program and receive an M.S.E. degree in Integrated Product Design and any of the other disciplines in the Engineering School such as Electrical and Systems Engineering, Bioengineering, Computer Science, Chemical and Biomolecular Engineering, and Materials Science Engineering. The dual degree program requires the completion of at least 17 courses (not including background courses) and satisfaction of the M.S.E. requirements of each department in which the student wishes to major. This program typically requires four semesters to complete. To enroll in this program, the student must complete an application form, list the course plan for both programs and obtain the approval from the Director/Graduate Group Chairman of each department. Applications for this program are available in the Academic Programs Office in 111 Towne Building.

## **11. SUMMER STUDIES**

There are several possibilities for scholarly activities by graduate students at the University during the summer which include:

- Independent study, master's research studio project thesis (IPD 899 or IPD 799) with an instructor willing to act as a supervisor during the summer.
- Course work outside SEAS, as well as a limited number of regular courses occasionally offered by some SEAS departments. The advisor, in consultation with the program Director, must approve summer school courses.

## **12. RECORDS**

The official graduate student records are kept in 111 Towne Building; transcripts can be viewed on Penn InTouch at <https://sentry.isc.upenn.edu/intouch>. Graduate students are encouraged to periodically check the accuracy of their records and to bring any discrepancies to the attention of the Director.

## **APPENDIX A**

