Plan of Study Requirements for Master of Science in Electrical Engineering

South Dakota State University
(Revised: Nov 2015)

1.) First semester courses must be approved by the EE Graduate Coordinator before registration using the attached Departmental Plan of Study form.
    a) The EE Graduate Coordinator is the primary point of contact for all Master of Science students in the EE department during their first year until the students advisory committee is formed and can help with the selection of an advisor.
2.) Before the end of the first semester, complete **Part 1** of the Departmental Plan of Study form with the assistance and approval of the Academic Advisor that is the same as Major Advisor and Graduate Coordinator.
    a) The Academic Advisor (or called Major Advisor and Graduate Coordinator) is *not* the student's research, thesis or project Advisor but can become one later.
3.) Before the end of the second semester, select a Thesis Advisor, form a three-member Advisory Committee approved by the Graduate Coordinator, and complete **Part 2** of the Departmental Plan of Study form.
    a) The Thesis Advisor is selected by mutual consent of the student and advisor and must have graduate faculty status.
    b) The committee should include the Thesis Advisor and two other faculty members, more than 50% of whom must be from EE that has been student's instructor for two or more courses and/or provided significant input on student's research.
    c) Any changes to the committee must be approved by the Graduate Coordinator. Graduate coordinator may or may not serve on the committee.
    d) At this time the student should complete and submit their plan of study to the graduate school using their form. After submitting plan of study to graduate school, graduate school will assign a graduate faculty representative
    e) All student Advisory Committee meetings need to include the graduate faculty representative.
4.) By the end of the second semester or early in the third semester, develop a research (option A) or design (option B) proposal with the Thesis Advisor.
    a) This should include a preliminary work plan and a timetable.
    b) This proposal should be presented (formally or informally) to the Advisory Committee, which may recommend changes to the plan.
5.) Students must complete the coursework outlined in the Plan of Study. Any changes to the Plan of Study must be approved by the Advisory Committee and Graduate Coordinator and resubmitted to the graduate school.
6.) **Students must have this form on file and work with graduate coordinator to update this form each semester to be eligible to work as a Graduate Assistant**.

MASTER OF SCIENCE IN ELECTRICAL ENGINEERING PLAN OF STUDY, SDSU

Before completing this form, review the Academic Policies & Degree Requirements in the Graduate Catalog

Student name:_____First semester enrolled_____

Student ID _____Email address _____

Masters degree option (circle one): A B Planned Graduation Date_____

Part 1.

Core Courses: Specify the track, corresponding core courses, and semester in which you intend to complete the ***core courses***. Core courses should be completed during the first year of study. (Unless waived by your advisor)

Circle track: Materials-Devices-PV Power Image & Signal Processing

Course number	Course name	Credits	Semester scheduled	completed	Grade

Supporting courses: The total number of credits must equal or exceed the required number for your degree option, and at least half must be 600 level or above.

- Courses taken from outside of the EE Department must be approved by your area-specific Academic Advisor and must support your proposed area of study.

Course number	Course name	Credits	Semester scheduled	completed	grade
Total (with core)					

Approval signatures:

Graduate Coordinator (1st semester)_____ Date:_____

Area-specific Academic Advisor (2nd semester)_____ Date:_____

Graduate Coordinator (2nd semester)_____ Date:_____

Part 2. (3rd semester) The faculty below agree to serve as the Academic Advisory Committee for this student and approve this plan of study.

Thesis Advisor/Committee Chair _____ Date:_____

Committee member _____ Date:_____

Committee member _____ Date:_____

Graduate coordinator_____ Date:_____

MSEE Electronic Materials, Devices, Photovoltaics Track

Rev. Nov 2015

Required track core classes

EE	560	Sensors and Measurements (sp) (2 cr)
EE	560L	Sensors and Measurements Lab (sp) (1 cr)
EE	554	Biomedical Instrumentation and Safety (sp, 3 cr)
EE	735	Photovoltaics (fall) (3 cr)
EE	737	Organic Photovoltaics (fall) (3 cr)
EE	765L	Electronic Materials Lab (fall) (3 cr)
EE	766	Thin Film and Plasma Processing (sp, 3cr)
EE	562L	Electronic Materials Fabrication Lab (fall) (1 cr)
EE	798	Thesis (6 cr)

Example elective courses (subject to committee approval)

Students may also be able to take other EE, Math, Statistics, and Physics course with committee approval.

EE	536	Photovoltaic Systems Engineering & lab(fall)
EE	536L	Applied Photovoltaics Lab(fall)
EE	736	Advanced Photovoltaics (TBD)
EE	790	Seminar
EE	791	Independent Study
EE	702	Nanomaterials (SDSM&T)
EE	720	Synthesis & Characterization of Nanomaterials (SDSM&T)
EE	716	Printed Electronics (SDSM&T)
EE	723	Luminescent Spectroscopy of Materials (USD)
EE	751	Linear Systems Theory
EE	770	Information and Signal Processing
EE	785	Microwave Theory
Chem	622	Advanced Organic Chemistry
Chem	724	Structure Determination of Organic Compounds
Chem	792	Electro-analytical Chemistry
CSS	702	Elements of Computational Science
Math	571 & 672	Numerical Analysis I
Math	673	Numerical Differential Equations
Math	770	Numerical Linear Algebra
Phys	771 & 773	Quantum Physics
Phys	792	Advanced Solid State Physics

Track Committee: Qiquan Qiao, Qihua Fan, Hyeun Joong Yoon

Sample Plan of Study: Total credits = 3**0**

Year	Fall		Spring	
	Course	**Cr**	**Course**	**Cr**
1	735 Photovoltaics	3	560 Sensors and Measurements & Lab	3
	737 Organic Photovoltaics	3	760 Thin film and plasma processing	3
	765 Electronic Materials & lab	4	554 Biomedical Instrumentation and Safety	3
Total		10		9
2	Photovoltaic Systems Engr & lab	4	791 Independent Study	1
	Seminar	1		
	Thesis	3	Thesis	3
Total		7		4

MSEE Power Systems graduate track

Rev. Nov 2015

Required Track core classes

EE	751	Linear Systems Theory (fall, 3 cr)
EE	731/L	Advanced Power Electronics (spring, 4 cr)
EE	732/L	Modeling and Control of Power Electronic Systems (fall, 4 cr)
EE	733/L	Advanced Power System Analysis (fall, 4 cr)
EE	734/L	Power System Dynamics and Stability (TBD)
EE	792	Computational Intelligence (spring, 3 cr)
EE	792	Electric Power Markets (spring, 3 cr)
EE	790	Alternative Energy Seminar (spring or fall) (1 cr)
EE	798	Thesis (6 cr)

Example track related elective courses (subject to committee approval)

Students may also be able to take other EE, Math, Statistics, and Physics course with committee approval.

EE	536/L	Photovoltaic Systems & Lab (fall, 4 cr)
EE	792	Wind Energy Systems (3 cr)
EE	792	Power System Protection and Restoration (TBD)
EE	735	Photovoltaics (fall)
MATH	575	Operations Research

Track Committee: Reinaldo Tonkoski, Tim Hansen, Zhen Ni, Steven Hietpas, Qiquan Qiao

Sample Plan of Study: **Power Track** (Total credits 3**0**)

Year	**Fall**		**Spring**	
	Course	**Credits**	**Course**	**Credits**
1				
Total Credits				
2				
Total Credits				

MSEE – Image & Signal Processing Track

Rev. Nov, 2015

Required track classes

EE	770	Information and Signal Processing-f
EE	575	Digital Image Processing (fall, 3 cr)
EE	7XX (new)	Optical Sensors-(fall, 3 cr)
Statistics	786 or 742 or 560	Regression Stat. or Spatial Stat. or Time Series Anal.
EE	790	Seminar

Example elective courses (subject to committee approval)

Students may also be able to take other EE, Math, Statistics, and Physics course with committee approval.

EE	7XX	Remote Sensing Engineering
EE	**7XX**	**Advanced Image Processing**
EE	**7XX**	**Atmospheric Optics and Radiative Transfer Theory**
EE	785	Microwave Theory
EE	765	Electrical Properties of Materials
EE	560	Sensor Theory and Design
Math	571, 771	Numerical Methods I, II
CS	705	Analysis of Algorithms
CS	750	Recent Advances in Parallel Processing
Stat	787	Regression II
Stat	721	Statistical Computing and Simulation
Chem	792	Electro-analytical Chemistry

Track Committee

Dennis Helder, Songxin Tan, Qiquan Qiao

Sample Plan of Study: **Image Processing Track** (Total credits 3**0**)

Year	**Fall**		**Spring**	
	Course	**Credits**	**Course**	**Credits**
1				
Total Credits				
2				
Total Credits				

STANDARDS FOR SDSU EE GRADUATE PAPERS (April 2002)

This document outlines the standards by which M.S.E. final papers should be evaluated.

A note to the student: DO NOT ASSUME ANYTHING. If you are in doubt as to whether your project or paper meets the guidelines outlined below, talk to your Major Advisor.

A note to Major Advisors: The student should select his/her advisory committee immediately after you agree to become the student's Major Advisor. You should convene a brief advisory committee meeting (which can be done via email) in which you propose a project plan and timetable, and all committee members must come to an agreement on its appropriateness and content. Doing this early in the student's career is an easy way to avoid difficulties later on. If a significant alteration in the student's plans becomes necessary, consult with the advisory committee. Bear in mind that the Major Advisor only has the authority to convene the committee and to make technical decisions regarding the daily operations of the project and its finer details. Deviations from the proposed plan of work, timetable, or plan of study must be approved by the advisory committee. When in doubt, consult with the Graduate Coordinator.

Thesis

A Thesis is a significant work that contains substantial original research. The following statements describe a thesis.

1.) The defining characteristic of a thesis is an original contribution to its field of study. A thesis must propose a new device, system, process, or other novelty. It is up to the writer of the thesis to prove the novelty of the contents of his/her thesis. If there is doubt, the student's advisory committee should be consulted. One metric that can be applied: if the work is publishable in a journal, it probably constitutes a thesis. If not, a paper should be considered.

2.) The thesis must contain a thorough literature search that shows the current state of the art; establishes the novelty of the idea presented; and demonstrates the need that is to be met by the new contribution.

3.) The thesis must clearly describe the development and underlying principles behind the new idea.

4.) The thesis must present experimental or other evidence that the new idea is feasible, and that it meets the need established in the literature search.

Design paper

Design papers detail the execution of the design process as applied to a particular design subject. The design subject can be a device, a system, a process, an algorithm, or software. The Advisory Committee determines the appropriateness of a design subject. The design subject need not be novel. This differentiates a design paper from a thesis. The following statements describe a design paper.

1.) A design paper must describe the execution of the elements of the design process, including: a) the definition of the project; b) specifications to be met by the design; c) brief discussions of the technologies used in the design; d) all relevant calculations; e) verification of proper operation of the design; and f) conclusions.
2.) The paper must contain a literature search detailing the state of the art of the device or system under consideration; the need being filled by the design presented in the paper; and evidence that the design presented in the paper is not readily available from another source. It is the responsibility of the author (student) to establish that these criteria are met.

Research paper

A research paper can be described as an extended literature search and synthesis of the literature for the purpose of answering a research question. Examples of research papers would include case studies, cost-benefit analyses, and analytical comparisons of options. The purpose of a research paper is to demonstrate that the author is able to use engineering knowledge to synthesize or analyze information from the literature in formulating an answer to the research question. A research paper is distinguished from a thesis by its scope, time requirements, and the possible absence of lab work. The following statements describe a research paper.

1.) It must pose a research question. This question must be one that is of current interest, and does not have a readily available answer from another source. It is up to the writer of the paper to justify that the question meets these criteria.
2.) It must use the current literature and available knowledge in order to answer the research question. The goal of the literature search is for the student to gain sufficient expertise to be able to pose an informed and supported answer to the research question. Research papers must therefore contain a thorough literature search, but an extended literature search by itself does not constitute a research paper.
3.) The paper must propose an answer to the research question based on what was learned in the literature search.