**pharmaceutical nanotechnology**

**Master of Science in Pharmaceutical Nanotechnology (M.S.P.N.) Degree**

**DEGREE INFORMATION**

**Priority Admission Application Deadlines:**

**Fall** February 15

**Spring** October 15

**Summer**  February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

**Minimum Total Hours:** 32

**Level:** Masters

**CIP Code:** 51.2099

**Dept Code: ---**

**Major/College Codes:** PNT / RX

**Effective:**  Spring 2016

**Concentrations:**

Biomedical Engineering

Drug Discovery, Delivery, Development & Manufacturing

**CONTACT INFORMATION**

College: Pharmacy

Contact Information: [www.grad.usf.edu](http://www.grad.usf.edu/)

**MAJOR INFORMATION**

The Master’s of Science degree in Pharmaceutical Nanotechnology is designed to train students in the skills they will need to understand the burgeoning technological advances in science at the nanoscale and how new nanomaterials and processes can be applied to drug delivery, diagnosis, treatment monitoring, tissue regeneration, personalized medicine and more. This major aims to bridge the gap between nanotechnology and medicine, providing students with advanced knowledge, skills and practical experience within the principles, technology and applications within this exciting and innovative area.

**Major Research Areas:**

Nano, Nanotechnology, Nano Pharmacy, Nano Pharmaceutics, Nano Pharmaceutical

**ADMISSION INFORMATION**

Must meet University requirements (see Graduate Admissions) as well as requirements for admission to the major, listed below.

* Bachelor’s degree preferably in the biomedical, biological, chemical sciences or engineering from a regionally accredited institution with a minimum overall GPA of 3.00 and present a score on the Graduate Record Examination (GRE) Medical College Admission Test (MCAT), or PCAT or DAT score.
* GRE, MCAT or DAT standardized test scores or evidence of substantial health/sciences experience. The GRE may be waived if the overall undergraduate GPA is 3.80 or higher. GRE may be substituted by minimum MCAT score of 20, PCAT or score of 55% DAT score of 19.
* A language proficiency test for international applicants from non-English speaking countries or who have not earned a degree in the United States must provide a minimum IELTS score of 6.5 taken within 2 years of the desired term of entry, a minimum PTE-A score of 53 or a minimum TOEFL score of 79 (internet-based test), 213 (computer-based test) or 550 (written test).
* Minimum of two (2) (Maximum of five) Letters of Reference (preferably from previous professors, employers within the field of science – all must be fairly recent – within the last five years of coursework or employment)
* A resume
* Interview (Optional)
* Final determination for admission will be made by Graduate Director based on GPA, GRE, MCAT, PCAT or DAT scores,

 letters of recommendations, resume and personal statement combined.

**CURRICULUM REQUIREMENTS**

**Total Minimum Hours – 32 credit hours**

Core Requirements - 11 credit hours
Non-thesis - 21 credit hours (including Track/Concentration requirements and electives)
Thesis - 21 credit hours (including Track/Concentration requirements and electives)
Electives - 3-18 credit hours (depending on chosen Track/Concentration)

**Core Requirements - 11 hours**PHA 6146 - 3 - Introduction to Nanotechnology
PHA 6119 - 3 - Micro-/Nanoscale Drug Delivery systems
PHA 6118 - 3 - Nanomaterials, BioMEMs and Nanodevices in Medicine
PHA 6797 - 1 - Scientific Writing and Communication
PHA 6277 - 1 - Ethics in Pharmaceutical Practice and Research

**Non-Thesis Option - 21 hours**
Students select from either the General Track, the Entrepreneurship Track, or a Concentration (i.e., Biomedical Engineering).

**General Track**In addition to the core requirements, students complete 18 hours of electives and a 3-credit Capstone course in which they submit and present an e-portfolio outlining their understanding of Pharmaceutical Nanotechnology as a whole with artifacts from previous courses that demonstrate their learning throughout the program. Students must successfully complete PHA 6533, including submission and presentation of e-Portfolio.

PHA 6533 - 3 - Graduate Program Capstone in Pharmacy

Electives - 18

**Entrepreneurship Track**

In addition to the core requirements, students complete 9 hours of electives; an Entrepreneurship course (PHA 6225); an internship in a matched industry, institute or center as approved by the Associate Dean of Graduate Programs; and a 3-credit Capstone course. The one-semester internship will culminate in a final project, which will be presented at the end of the Capstone course. As part of the Capstone course, students will also submit and present an e-portfolio outlining their understanding of Pharmaceutical Nanotechnology as a whole with artifacts from previous courses that demonstrate their learning throughout the program. Students must receive an evaluation of Satisfactory or higher from their internship supervisor to successfully complete the Internship course. Students must also successfully complete PHA 6533, including submission and presentation of e-Portfolio.

PHA 6225 - 3 - Invention, Innovation & Entrepreneurship
PHA 7001 - 6 - Graduate Program Internship in Pharmacy
PHA 6533 - 3 - Graduate Program Capstone in Pharmacy

Electives - 9

**Biomedical Engineering Concentration**  - 15 hours
In addition to the core requirements, students complete 3 hours of electives, 15 hours of Biomedical Engineering Concentration requirements, and a 3-credit Capstone course in which they submit and present an e-portfolio outlining their understanding of Pharmaceutical Nanotechnology as a whole with artifacts from previous courses that demonstrate their learning throughout the program. Students must successfully complete all Biomedical Engineering Concentration required coursework and PHA 6533, including submission and presentation of e-Portfolio.

GMS 6440 - 3 - Basic Medical Physiology *OR* BME 6409 - 3 - Engineering Physiology

GMS 6605 - 3 - Basic Medical Anatomy

PHC 6051 - 3 - Biostatistics II

BME 6000 - 3 - Biomedical Engineering I

BME 6931 - 3 - Biomedical Engineering II

PHA 6533 - 3 - Graduate Program Capstone in Pharmacy

Electives - 3

**Thesis Options - 21 hours**Students select from either the Research Track or a Concentration (i.e., Drug Discovery, Delivery, Development & Manufacturing).

**Research Track**In addition to the core requirements, students complete 13 hours of electives and 8 hours of thesis research (to be taken over the final three semesters in a 3-3-2 credit hour sequence). Students will conduct original research in a lab approved by the Associate Dean of Graduate Programs and submit a final Committee-Approved Thesis, including oral defense, following guidelines from the Office of Graduate Studies. Students must submit a final Committee-Approved Thesis, including oral defense, following ETD guidelines from the Office of Graduate Studies (<http://www.grad.usf.edu/ETD-res-main.php>).

PHA 6971 - 8 - Thesis (to be taken over the final three semesters in a 3-3-2 credit hour sequence)

PHA 6971 - 8 - Master Thesis
Electives - 13

**Drug Discovery, Delivery, Development & Manufacturing (D4M) Concentration**In addition to the core requirements, students complete 4 hours of electives, 8 hours of thesis research (to be taken over the final three semesters in a 3-3-2 credit hour sequence), and 9 hours of D4M Concentration requirements. Students will conduct original research in a lab approved by the Associate Dean of Graduate Programs and submit a final Committee-Approved Thesis, including oral defense, following guidelines from the Office of Graduate Studies. Students must successfully complete all D4M Concentration required coursework and submit a final Committee-Approved Thesis, including oral defense, following ETD guidelines from the Office of Graduate Studies (<http://www.grad.usf.edu/ETD-res-main.php>).

PHA 6971 - 8 - Master Thesis

PHA 6124 - 3 - Principles of Pharmacokinetics and Pharmacodynamics

PHA 6147 - 3 - Nanotechnology and Risk Management

PHA 6185 - 3 - Drug Discovery and Frontier

**Approved Electives**PHA 6124 - 3 - Principles of Pharmacokinetics and Pharmacodynamics

PHA 6147 - 3 - Nanotechnology and Risk Management
PHA 6148 - 3 - Nanoformulations and Nanopharmaceutics

PHA 6185 - 3 - Drug Discovery and Frontier
PHA 6222 - 3 - Pharmacy Practice Management

PHA 6225 - 3 - Invention, Innovation & Entrepreneurship

PHA 6245 - 3 - Pharmaceutical Informatics
PHA 6318 - 3 - Modern Human Diseases, Diagnosis and Treatment
PHA 6449 - 3 - Pharmacogenomics - Current and Future Prospects
PHA 6336 - 3 - Tissue Engineering and Regenerative Medicine
PHA 6618 - 3 - Principles of Geriatric Medicine
PHA 6622 - 3 - Advanced Geriatric Pharmacy Care

PHA 6756 - 3 - Bioengineering and Nano-biomedical Prospects
PHA 7930 - 1-3 - Special Topics in Pharmacy

GMS 6010 - 3 - Personalized Medicine
GMS 6183 - 3 - Clinical Research Methods
GMS 6201 - 3 - Basis Medical Biochemistry
GMS 6440 - 3 - Basic Medical Physiology

GMS 6505 - 3 - Basics Medical Pharmacology
GMS 6605 - 3 - Basic Medical Anatomy

**Comprehensive Exam**

 and presentatione-P For thesis students, the final Committee-Approved thesis, including defense, will be used in lieu of a comprehensive exam.

**Possible Sequence**

Fall - total 12 credit hours
PHA 6146 - Intro to Nanotechnology 3 Cr
PHA 6797 - Scientific Writing and Communication 1 Cr
PHA 6277- Ethics in Pharmaceutical Practice and Research 1 Cr
Track/Concentration requirements and/or Electives 7 Cr

Spring - total 12 credit hours
PHA 6119 - Micro-/Nano Drug Delivery Systems 3 Cr
PHA 6118 - Nanomaterials, BioMEMs and Nanodevices in Medicine 3 Cr
Track/Concentration requirements and/or Electives 6 Cr

Summer - total 8 credit hours
Final Thesis hours and/or Capstone 2-3 Cr

Electives 5 Cr

**COURSES**

 See <http://www.ugs.usf.edu/course-inventory/>