**Independent Study**
**Research Experience in Nanomedicine**
**PHAR 7299**

## Course Description
Laboratory-based course in research methods used in drug discovery/formulation research.

## Additional Information on the Course
This course introduces the students to different research methods used in the drug discovery field. Several techniques will be covered including nanoparticle synthesis, tissue culture, molecular biology, protein expression in different biological systems, and biochemical assays. The course is focused on the application of nanomedicine (a branch of nanotechnology) for the treatment, diagnosis, monitoring, and control of the biological system.

## Course Credit
2 Credit Hour (this credit hours can be up to 4 depending on the depth of the study)

**Pre-Requisite courses:** None (Students in Graduate Program)

**Co-Requisite courses:** None

**Class Meeting Days, Time and Location:** TBD, 3rd-floor laboratory

## Course Coordinator
Santosh Aryal, Ph.D.
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Office hours: TBD
Preferred method of contact: Email/ in-person

**Fisch College of Pharmacy (FCOP) and UT Tyler Policies**
This is part 1 of the syllabus. Part 2 contains UT Tyler and the FCOP course policies and procedures. These are available as a PDF at https://www.uttyler.edu/pharmacy/academic-affairs/files/fcop-syllabus-policies.pdf. For experiential courses (i.e., IPPE and/or APPE), the Experiential Manual contains additional policies and instructions that supplement the Syllabus Part 1 and 2. Please note, the experiential manual may contain policies with different deadlines and/or instructions. The manual should be followed in these cases.

## Required Materials
Course required materials are available through the Robert R. Muntz Library. These materials are available either online* (http://library.uttyler.edu/) or on reserve. Other materials may be found online or provided by the course coordinator.

## Course Format
The course includes the following activities:
1. Independent readings of research materials provided by the coordinator.
2. Lab work
3. Clearly writing the finding.

**Course Learning Outcomes (CLOs)**

The central objective of this course is to introduce students to the concept of nanomedicine and its design criteria and application in the biomedical field. The student will be able to understand the essential features of nanomedicine, nanochemistry, and biology that are converging to the interdisciplinary field.

1. Investigate information on nanomedicine and how it is related to a broader spectrum of biomedical applications.
2. Develop skills and ability to work as an active participant in a research environment.
3. Develop skills in nano-engineering to design a medicine to target multifarious biological environments.
4. Gain knowledge on evaluating the medicinal impact on the disease of interest.
5. Understand nano-synthesis and bioconjugation strategies.
6. Summarize results in the form of Research Presentation (oral or poster) and/or manuscript/report writing

**Course Assessment Methods**

| S. N. | Assessment Method | Description |
|---|---|---|
| 1 | Individual Project | Under the supervision of the course coordinator/instructor, the student will design an independent project in a pharmacy-related area of interest, including specific goals and an action plan. |
| 2 | Oral Presentation | At the end of the independent study, the student will give an oral presentation of their experience, including any pertinent research findings. |
| 3 | Poster Presentation | A possible alternative to assessment method 2. |
| 4 | Internship/Observation | Lab work observation and mentoring |

**Grading Policy & Grade Calculation**

Grades will be determined based on the evaluation of the project, including goals, plans, reflections, and presentations.

Standard Grade Calculation*

Plan, Goals & Week-Week Activities 70%
Final Presentation of Project 30%

| | |
|---|---|
| A | 90 - 100 % |
| B | 80 - 89.999̄ % |
| C | 70 - 79.999̄ % |
| D | 65.0 - 69.999̄ % |
| F | < 65.0 % |

**Tentative Schedule**

| Week | TOPIC | CLO | Disease States |
|---|---|---|---|
| 1 | Orientation to Course & Project Determination | 1 | NA |
| 2 - 14 | Design and Execution of Project<br>• Synthesis of Nanoparticles | 2-5 | NA |

| | | | |
|---|---|---|---|
| | • Characterization of Nanoparticle: size & surface properties<br>• Nanoparticle Surface Functionalization: Antibody or targeting ligand labeling and characterization<br>• Tissue culture: cancer cells and normal cells<br>• Labeling of Nanoparticles with various dyes<br>• Nanoparticle Cellular Interaction Studies using Microscopic and Flow cytometric Techniques<br>• Drug Loading and Release Kinetic Studies<br>• Protein identification (Western Blot) | | |
| | | | |
| 15 | Final Presentation of Project | 6 | NA |