

Module Independent Studies

Overview of the study program Nano-Science (Master of Science)

Fach-semester	LP				
1.	30	Basic Module Biology (M1)	Basic Module Chemistry (M2)	Focus Module 1 (M4)	Nano-Science III (M7)
2.	30	Basic Module Physics (M3)	Focus Module 2 (M5)	Focus Module 3 (M6)	
3.	30	Independent Studies (M8)			Master Seminar (M9)
4.	30	Master Thesis (M10)			

Requirements for participation:

Successful participation in the basic modules M1, M2 and M3 as well as two focus modules out of M4, M5 und M6

Module Independent Studies

Lehr- /Lernformen*	optional Vorlesungen, Seminare, Übungen, Praktika
Modulinhalt*	<p>Im Rahmen dieses Moduls sollen die Studierenden, nach Rücksprache mit dem Betreuer des Moduls, ihre spezifischen Interessensgebiete innerhalb des Fachs Nano-Science intensiv studieren und bearbeiten. Diese Interessensgebiete sollen im Dialog mit den betreuenden Dozenten erarbeitet und definiert werden, wobei in Studienplänen und Zielvereinbarungen die Lern- und Qualifikationsziele festgelegt werden. Diese Studien können nach Abstimmung mit den betreuenden Dozenten sowohl an der Universität Tübingen als auch an weiteren in- und ausländischen Hochschulen und Forschungsinstitutionen und im Rahmen innerbetrieblicher Praktika erfolgen.</p>
Qualifikationsziele*	<p>Die Studierenden</p> <ul style="list-style-type: none">• vergleichen und analysieren Lern- und/oder Forschungsumgebungen außerhalb der Universität Tübingen;• erweitern ihre Erfahrungen auf alternativen Felder, u. a. in Forschungsinstitutionen, Industrie, Ausland;• können ihre interdisziplinären und interkulturellen Interessen und Fähigkeiten ausbauen;• fokussieren ihre Studien- und Forschungsinteressen auf ein Teilgebiet der Nano-Science

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- Individual enlargement of nano-science expertise
- Areas of interest are developed in dialogue with the supervisor
- Analog: Curricula, learning and qualification goals
- Studies may be carried out at:
 - Tübingen University
 - german and foreign universities
 - german and foreign research institutes
 - german and foreign companies.

Module Independent Studies

27 ECTS

(810h student working time)

ca. 16 weeks full time (8h/day)

varies depending on the configuration

- The students are fully responsible for the organisation of the module.
- All activities contributing to the module must be approved by one of the heads of the master course in advance.

Module Independent Studies

Heads of the master course

Physics

Prof. Martin Oettel, Prof. Hans Joachim Schöpe, Prof. Frank Schreiber

Chemistry

Prof. Reiner Anwander, Prof. Andreas Schnepf, Dr. Claudio Schrenk

Biology

Prof. Klaus Harter, Dr. Anita Jannasch, Prof. Erik Schäffer

Module Independent Studies

- The module is approved by the supervisor of choice using a special form

DOWNLOAD:

<http://www.mnf.uni-tuebingen.de/fachbereiche/biologie/studium/studiengaenge/nano-science/master-msc/downloads.html>

Module "Independent Studies"

→ Independent Studies Certificate

- A copy must be sent to Prof. Schöpe!
- The chosen head of the course acts as a "mentor". He confirms the achievements at the end of the module for the examination office.

Excerpt of the admission form

Name:

Matrikelnummer:

Geplantes Vorhaben				Name Mentor/in (Fachvertreter/in)	
Auslandssemester	Praktikum extern Wiss. Einrichtung	Praktikum extern Unternehmen	Studium Tübingen		
				← kurze Angabe (bei Studium Tübingen genügt ein Kreuz)	
				← Zeitraum	
Vorlage Expose /Studienplan				Datum	Unterschrift
<input type="checkbox"/> ja <input type="checkbox"/> nein					
Bemerkungen					
Vorlage Studienleistungen (3 Basic Modules, 2 Focus Modules)				Datum	Unterschrift
<input type="checkbox"/> ja <input type="checkbox"/> nein					
Bemerkungen					

Module Independent Studies - Possibilities

- Completing the module at Tübingen university
- Studying abroad at a foreign university
- Research internship at a german or foreign university
- Non-university internship
- Combinations thereof

Completing the module at Tübingen university

- Scientific work in a nano-science related work group
- Attending lectures / seminars / lab courses

Rules

- Scientific work in one particular workgroup (practical course) can be credited maximally with 15 ECTS.
- Attention: It is important to note that it is not permitted to carry out the master's thesis in the same workgroup where the practical course was completed.
- The mentor must confirm the attended lectures / seminars / lab courses.

Completing the module at Tübingen university

Possible lectures / seminars / lab courses

- Courses not yet taken
- List of other courses:
 - Ilias
- Exotic: In consultation with mentor

Studying abroad

- Courses related to nano-science
- The mentor must approve that the planned stay fulfils the requirements
- The individual courses to be credited can also be assembled on the spot but must be confirmed by the mentor via email.
- For orientation: offered courses in Tübingen

Research internship at a domestic or foreign university

- Scientific work related to nano-science
- Confirmation by the mentor in advance!
- Summary of the planned internship by the host in advance is very welcome.
- Please also take a look at the web-pages of the nano-science work groups in Tübingen and/or ask one of the heads for suggestions.

Non-university internship

- Scientific work related to nano-science
- Research institute (MPI, Fraunhofer, major research institution...) or industrial company
- **Summary and project plan**
of the planned internship by the project leader in the company in advance **are mandatory.**

Modul "Independent Studies"

→ Bestätigung Pflichtpraktikum für Independent Studies in der Industrie

DOWNLOAD

<http://www.mnf.uni-tuebingen.de/fachbereiche/biologie/studium/studiengaenge/nano-science/master-msc/downloads.html>

- The mentor must confirm the connection to nano-science

Summary and project plan - Example

Project title: **Electrospray deposition of polymer micro- and nanostructures as potential carriers for drug delivery**

Outline

This research project aims at the synthesis and characterisation of polymeric micro- and nanoparticles as drug carriers systems. The particles will be synthesized by means of electrospraying, using Spraybase® instruments and two main strategies will be used for the encapsulation of the model drug. In the first approach the drug will be dispersed into the polymer solution to be electrosprayed. In the second method a core/sheath approach will be pursued utilising coaxial electrospraying. Biocompatible polymers soluble in organic solvents like polycaprolactone (PCL), poly(lactic-co-glycolic acid) (PLGA), chitosan as well as water soluble polymers that can be cross-linked after deposition, like PVA will be employed. PCL and PLGA are amongst the most used polymers in nanoscience which are FDA approved. PCL of different molecular weight and various PLGA with different lactic acid to glycolic acid ratios will be considered. For characterisation purposes the model drug will be modified with a fluorescent probe and the distribution of the drug will be elucidated by means of fluorescence microscopy while size and morphology of the particles will be evaluated using SEM (scanning electron microscopy). Finally the two most promising polymer-drug systems will be selected for release studies.

Summary and project plan - Example

Training and responsibilities

- The student will receive appropriate training in the relevant techniques by Spraybase scientists
- The student will be asked to describe experiments and discuss results in weekly reports
- At the end of the 3 months the student will be asked to summarise findings and submit a final written report

Growth and development

The 3 months internship will enable the student to acquire competencies that will enhance the prospects of reaching independent thinking and autonomy in a laboratory environment. Amongst the transferable skills the student will acquire:

- Training in state-of-the-art electrospraying instrument
- Work experience in a private company
- Expertise in microencapsulation through electrospraying, one of the emerging technologies in nanoscience
- Training in microscopy techniques like fluorescence microscopy, scanning electron microscopy

Summary and project plan - Example

Project plan and work-packages

WP1, Nov 2016: Electrospraying training

Deposition micro/nano particles of PCL

Study of the effect of experimental parameters (polymer concentration, solvent system, flow rate, emitter diameter, working distance) on particle size and morphology

Optical/Fluorescence Microscopy training

SEM training

WP2, Dic 2016: Generation of micro/nano particles with PLGA, chitosan, PVA.

SEM characterisation

WP3, Jan 2017: Drug encapsulation, dispersion method

Evaluation of entrapment efficiency

SEM characterisation

Fluorescence microscopy

WP4, Feb 2017: Drug encapsulation, coaxial electrospraying

Characterisation of core/sheat particles (technique to be decided yet)

Release studies (UV-Vis) on best 2 systems from WP3 and WP4

WP5, 1-6 March 2017: Final report

Combinations

Combinations are allowed – for example:

- Internship in industry combined with scientific work in a workgroup at Tübingen university.
- Research internship at a foreign university combined with lectures at Tübingen university.

Studying abroad

- Exchange program of the university of Tübingen with partners
- AuslandsBAföG
- Erasmus program
- DAAD fellowship
- Fulbright fellowship
- PROMOS-program – DAAD
- Baden-Württemberg-Stipendium
- GOstralia! and GOzealand!
- BAYER Fellowship
- Studienstiftung des deutschen Volkes
- IELTS Award

Studying abroad

Dezernat für Internationale Angelegenheiten

Austauschprogramme

Wilhelmstraße 9 (Eingang: Nauklerstraße 2)

D-72074 Tübingen

Tel.: +49-7071-29-76448

Fax: +49-7071-29-5404

intrel@uni-tuebingen.de

Öffnungszeiten:

Montag-Freitag, 9-12:00 Uhr, außer Mittwoch

Studying abroad

<http://www.uni-tuebingen.de/international/studieren-im-ausland.html>

Detailed information dealing with

- exchange programs
- funding
- events
- application procedure
- **dead lines**
- . . . as well as contact details for personal advice

Do not forget: the admission form

EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN



Mathematisch-naturwissenschaftliche Fakultät
Studiengang Nanoscience (MSc)

Koordination:
PD Dr. Hans Joachim Schöpe
Dr. Claudio Schrenk

Studienleistungsbescheinigung Independent Studies

Das Modul Independent Studies im Masterstudiengang Nanoscience im Umfang von 27 ECTS-Punkten muss von einem Mentor (Fachvertreter) begleitet werden.
Das vollständige Formular reichen Sie im Prüfungsamt ein.

Tragen Sie hier Angaben zu Ihrem Vorhaben ein.

Nur mit der Bestätigung des vorliegenden Exposés/Studienplan (für alle Varianten!) mit Datum und Unterschrift Ihres Mentors kann Ihr Vorhaben als Modul "Independent Studies" anerkannt werden.

Maximal 9 ECTS-Punkte können vor dem Vorliegen der Vorleistungen (3 Basic Modules, 2 Focus Modules) für das Modul angerechnet werden. Die Vorleistungen weisen Sie Ihrem Mentor über die entsprechenden Studienleistungsbescheide und das Transcript nach.

Name:

Matrikelnummer:

Geplantes Vorhaben				Name Mentor/in (Fachvertreter/in)	
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Bemerkungen					
Vorlage Studienleistungen (3 Basic Modules, 2 Focus Modules)				Datum	Unterschrift
<input type="checkbox"/> ja <input type="checkbox"/> nein					
Bemerkungen					

must be submitted to Prof. Schöpe

Seminar Independent Studies

apl. Prof. Dr. Hans Joachim Schöpe

`hans-joachim.schoepe@uni-tuebingen.de`

Dr. Claudio Schrenk

`claudio.schrenk@uni-tuebingen.de`

Wednesday 15–17 in PN2N52

Answering various questions, filling out forms, etc.