



UNC
GLOBAL

THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

COLLEGE OF ARTS & SCIENCES

STUDY ABROAD OFFICE

FedEx GLOBAL EDUCATION CENTER
CAMPUS BOX 3130
CHAPEL HILL, NC 27599-3130

T 919.962-7002
F 919.962-2262
studyabroad.unc.edu

September 1, 2015

Administrative Boards of the College of Arts and Sciences
Office of General Education
UNC-CH

Dear Colleagues:

Student Exchange Program with Ulsan National Institute of Science and Technology (UNIST), Ulsan, Republic of Korea

We are submitting for your approval a proposal to establish a student exchange program with the Ulsan National Institute of Science and Technology (UNIST) with Fall, Spring, and Summer options, commencing Summer 2016. It will be open to Department of Biomedical Engineering (BME) students at UNC-CH (UNC-CH Chemistry and Physics majors may also participate) and School of Life Sciences students at UNIST. This exchange will be primarily for undergraduate students, but graduate students may participate with faculty advisor approval. Students will participate in this program on an exchange-only basis.

The Department of Biomedical Engineering is a joint department of UNC-Chapel Hill and NC State University:

<https://www.bme.unc.edu/index.php/about>

The joint Department will offer a single undergraduate program and degree from fall 2017, at which point all undergraduate students in the program (from both UNC-Chapel Hill and from NC State University) will be eligible to participate in this exchange program with UNIST.

Further information about UNIST can be reviewed at:

<http://www.unist.ac.kr/>

Dr. Bob Miles, Associate Dean: Study Abroad and International Exchanges, and Lindsay Heiser, Asia Programs Coordinator, visited with faculty and staff of UNIST and reviewed its facilities in February 2015.

UNIST

UNIST opened its doors in 2009 in Korea's largest industrial city, Ulsan. It is a public university devoted to science and technology and it aspires to being ranked amongst the top ten science and technology universities in the world by 2030. UNIST enrolls 3,790 undergraduate students and 775 graduate students, and employs 233 faculty as of 2014. 100% of academic courses are taught in English.

UNIST's nine schools house 18 departments and 21 majors. The schools are: the School of Business Administration, School of Design and Human Engineering, School of Electrical and Computer Engineering, School of Energy and Chemical Engineering, School of Life Sciences, School of Materials Science and Engineering, School of Mechanical and Nuclear Engineering, School of Natural Science, and the School of Urban and Environmental Engineering.

UNIST has fifteen research centers, the majority of which are open to undergraduate research participants. UNIST's Central Research Facilities (UCRF) was established in 2009 for the purpose of enhancing the research abilities of UNIST through the sharing of expensive equipment, the promotion of interdisciplinary studies, and the establishment of a network of professionals specialized in analysis and instrumentation. The UCRF possesses an analysis lab, clean room, machine shop, environmental analysis lab, the UNIST-Olympus Biomed Imaging Center (UOBC), the In Vivo Research Center (IVRC) and the UNIST Radiation Safety Lab.

The UNIST campus is located several miles west of the Ulsan city center. Access to the city is available by bus and taxi, and access to Seoul and other destinations in South Korea is available by high-speed rail.

Research Collaboration Context

Ongoing research collaboration between UNIST faculty and BME faculty at UNC-CH provide the context for this student exchange program. There are a number of research collaborations that are currently on-going and new ones will be forged as the BME faculty at UNC-CH and UNIST become more familiar with common activities. For example, Prof. Steve Soper and Prof. Yoonkyoung Cho (Chair, BME UNIST) have had on-going collaborations for four years on building point-of-care diagnostics for a variety of disease states. Soper/Cho have supported this work through a number of venues, such as those at the National Science Foundations in the USA and Korea. These joint research activities that are anticipated for this program takes advantage of common research themes across both UNIST and UNC-CH and utilize the unique research infrastructure at both universities.

At BME UNC-Chapel Hill, Soper has a number of undergraduate students working on a joint UNC-CH/UNIST project already. For example, Ms. Ashlyn Young was an undergraduate BME major (and is now a BME graduate student) who was engaged in a project with Soper for one year and built new devices and basic concepts that are being transferred into the laboratory of Prof. Cho at UNIST. A student, who could continue this initial effort and has an interest in this type of project could work at UNIST over the summer months with Prof. Cho as part of this program to build new types of devices and their characterization based on a unique area, which is currently not performed here at UNC-CH. Thus, it complements nicely the type of activities currently on-going at UNC-CH. This type of project is funded by Federal agencies in the USA and South Korea. This is just one example of the type of interactions that are and will be on-going.

Future projects will be spawned by other faculty in both BME departments as our faculty become more familiar with the partnering institution. To facilitate this endeavor, BME UNC-CH is now participating in a joint faculty seminar program with BME UNIST to sponsor one speaker per semester to visit the partnering institution to become familiar with the partnering institution's faculty and build new collaborative relationships that will allow our UNC-CH undergraduates a unique research experience at UNIST across many focus areas, especially those of common interest to both departments, such as Biomedical Microdevices, Regenerative Medicine, Bioimaging, Rehabilitation Engineering and Pharmacoengineering. These projects are continuously funded by Federal agencies at the host institutions as well as by institution-specific funding.

UNC-CH undergraduate students who participate in independent research within the BME department have to submit a research proposal at the start of the research project, and a research report at the end. They also complete a research contract that outlines their commitment for the duration of the research project. Students enroll in BMME 395, which is the Research in Biomedical Engineering for the Undergraduate course, which awards between 1 – 4 credits. During the current semester (Fall 2015) there are 9 BME students enrolled in BMME 395 – ranging from 2-4 credits (one student enrolled for 2 credits, one student enrolled for 4 credits, and the remaining students enrolled for 3 credits). For the exchange program with UNIST, our students would adhere to the same rules and procedures, but the research contract will be jointly agreed upon by a faculty member at UNC-CH and one at BME UNIST as well.

Program Rationale

UNIST would offer UNC-Chapel Hill undergraduate BME students the opportunity to take valuable coursework in UNIST's School of Life Sciences that compliments the BME curriculum here at UNC-Chapel Hill, as well as to engage in undergraduate research using the excellent research facilities available at the UNIST campus.

Instruments currently in use by the School of Life Science's Central Research Facilities include an Ultra centrifuge, Moflo XDP Ultra Workflow system (FACS, Sorting), High speed/throughput Real Time PCR System, Film developer, ELISPOT reader, Gel

documentation system, In-vivo electroporator, Solid phase extraction system, Table top research anesthesia system, Biomolecule purification system, UV/VIS Spectrophotometry system (Nano drop), Gas Chromatograph System, High Performance Liquid Chromatograph System, DNA Thermocycler (PCR), Image Analysis System (Gel doc), Digital Fuzzy-Controlled Autoclaves-steam Sterilizer (Autoclave), SPR Analysis System, Concentrator, Bioanalyzer, and 3-D Modeling machine. In addition, UNIST possesses excellent instrumentation and tools for nanofabrication and surface characterization that are not presently housed in the Chapel Hill Nanofabrication Laboratory (CHANL), such as an electron beam writer, Nanoimprint lithography, AFM coupled to a Raman spectrometer, and a plethora of super resolution microscopes.

UNC-Chapel Hill students would have opportunities to participate in independently arranged projects or in projects currently underway between UNC-Chapel Hill and UNIST faculty collaborators as described above. For example, NSF-supported fellowships for students seeking to study abroad would be facilitated by this program due to the state-of-the-art equipment at UNIST and the active collaborations between researchers at both UNC-Chapel Hill and UNIST. The opportunity for undergraduate students to participate in this program will provide them with the unique ability to become familiar with instruments not present on the UNC-Chapel Hill campus and at the same time, instruct them on functioning in an international environment.

In addition to exceptional research opportunities, UNIST offers immersion with local students in regular undergraduate life, with all academic offerings in English. UNIST's Language Education Center (LEC) provides credit-bearing Korean courses designed specifically for international students to study Korean language and culture. Mandarin language courses are also available to our students through the LEC.

Academic Requirements and Credit

Semester Exchange: The UNIST fall semester is from mid-August to late November and the spring semester from late February to mid-June. UNC-CH students could study at UNIST as exchange students for a fall or spring semester and would take a minimum course load of 12 credit hours (and up to 18 credit hours) during the semester. To be eligible to apply, UNC-CH students must have a minimum GPA of 2.75 and at least sophomore status when abroad. There will be no language prerequisite given that all instruction at UNIST is in English, but students will be required to study Korean throughout their program in order to better manage and understand their engagement with Korean society. This exchange will convey UNC-CH transfer credit (TREQ) to students who successfully earn a C or better in their UNIST coursework (including a required two credit Korean language course) and in their research project.

Listed below are undergraduate courses (all are three credit courses) that can be taken within the BME UNIST program:

BME505 Advanced Bioanalysis
BME509 Introduction to Biomedical Optics
BME609 Advanced Fluorescence Microscopy
BME590 The Seminars
BIO501 Advanced Biochemistry
BIO502 Advanced Molecular Biology
BIO503 Advanced Cell Biology
BME501 Biology and Micro/Nanotechnology
BME502 Advanced Biomedical Engineering
BME503 Advanced Spectroscopy and Imaging
BME508 Engineering Physiology
BME510 Quantitative Systems Biology
CHM582 Advanced Nanoscience and Nanotechnology
BME504 Design and Analysis of Experiments
BME506 Special Topics on Biomimetic Engineering
BME507 BioMEMS
BME601 Essential Biology for Engineers
BME602 Micro and Nanofabrication
BME603 Special Topics in Metabolic Engineering
BME604 Advanced Topics in Computational Neuroscience
BME605 Quantitative Analysis for Biomedical Images
BIO607 Advanced Microbial Physiology
BME607 Current Topics of Synthetic Biology
BME608 Lasers in Biomedical Engineering
BME700 Technical Writing in English
BME701 Biorefinery
BME703 Current Topics in Bioenergy and Biotechnology
BME704 Spatial Aspects of Magnetic Resonance
BME705 Control of Biomolecules
BME706 Frontiers of Biomedical Engineering
BME707 Inventions and Patents

Many of these UNIST BME courses are similar or identical to courses taught at UNC-Chapel Hill. Others (such as Special Topics on Biomimetic Engineering, and Current Topics in Bioenergy and Biotechnology) are not. Access to the latter classes will allow the UNC-CH students a unique opportunity to broaden their curriculum and educational experiences. UNC-Chapel Hill students would enroll in a minimum of two and a maximum of four of the courses listed above.

Additionally, students would work under the umbrella of a pre-arranged and joint project between a researcher at UNC-CH and one at UNIST during the course of their exchange semester at UNIST and at UNC-Chapel Hill. The expectations for the student will be determined by faculty participants in the joint project at both institutions. The student will select a research project and advisor for the project prior to arrival at the partner university. As part of the research project, students may have to undergo a training course to gain access to the appropriate laboratory equipment. During the

course of the project, faculty supervisors will have regularly scheduled meetings with the students under their supervision. At the end of the project, at the host institution, students will be required to write a written report. Assessment for these research credits will take place at the end of each semester during the student's residence in the host institution, and the host institution faculty member will assign the final letter grade on the host institution transcript for a course equivalent to BMME 395 at UNC-Chapel Hill.

Summer Exchange: We are proposing a standard bilateral summer exchange program with UNIST. UNIST's Summer Program of Internship and Korean Experience (SPIKE) summer session attracts students from the National University of Singapore, the University of Michigan-Ann Arbor, the University of Pennsylvania, and other institutions. While Michigan and Pennsylvania students study at UNIST from late June to late August, given the late-August end date relative to the UNC-CH academic calendar, UNC-CH students would study at UNIST from mid-June to early August (approximately 7 weeks in total). UNIST offers this same schedule to NUS, which also has an early August fall semester start date.

The exchange program that UNIST will offer to UNC-CH students consists of a Korean language course (30 hours/2 TREQ credits for a C or better) and a research internship (35 hours weekly for 7 weeks/5 TREQ credits for a C or better), for a program total of 7 TREQ credits. The language course is designed to provide introductory knowledge of Korean language as well as culture. The course introduces students to aspects of traditional Korean culture and contemporary Korean society, including topics pertaining to religion, values, family life, industrialization, gender roles, and popular culture. Students with previous Korean language experience will take individualized or small-group language tutorials catered to their skill level and language goals.

The research internship will be graded jointly by the UNIST faculty research supervisor and the UNC-CH faculty designate. Assessment criteria will follow the same lines as those discussed for undergraduate students doing semester stints at the host institution. These assessments will occur at the end of the research internship. UNC-CH students will complete 35 hours of work per week in a laboratory at UNIST for 5 credits on the UNIST transcript (for a 7 week appointment, the total number of research hours would be 245 hours). Because UNC-CH students will be required to take the language course in addition to the research internship, and the research period will be condensed due to the start date of UNC-CH's fall semester, UNIST's International Programs staff recommended that we limit the number of required research hours for summer students to the numbers stated in this proposal. That said, these are the minimum contact hours needed for transfer to equivalent UNC credit. Students are likely to participate in their research for a greater number of hours.

UNC-CH summer exchange students will live on the UNIST campus with a Korean roommate. The summer session offers many activities including city tours of Ulsan and Busan, industry visits (Hyundai, SK Energy, etc.), scholarly lectures on science and technology, an excursion to historical Gyeongju, cultural workshops (hanbok wearing, traditional cooking, crafts, etc.), athletic competitions, and the option for a brief

homestay with a local Korean family.

To be eligible to apply, UNC-CH students must have a minimum GPA of 2.75 and at least sophomore status when abroad. There will be no language prerequisite, but students will be required to take the appropriate Korean language course.

UNC-Chapel Hill will offer the following summer program in Chapel Hill to UNIST students. UNIST students participating in the summer exchange would enroll in one 3-credit UNC-CH Summer School Session II course as well as 4 credits of the BME research course (BMME 395). The research course would require students to complete at least 150 hours of work in a laboratory at UNC-CH or 30 hours per week for a 5 week session. The assessment of their summer internship accomplishments will follow the same format as that delineated above for UNC-CH students at UNIST. UNIST students will earn a total of 7 UNC-CH credits for the summer exchange.

Safety and Security

The US Department of State travel site states that the Republic of Korea is a “highly developed, stable, democratic republic . . . a modern economy where tourist facilities are widely available.” While tensions continue between Seoul and the Democratic People’s Republic of Korea, the Republic of Korea “maintains a high level of readiness to respond to any military threats from the DPRK.” There are no Department of State Travel Warnings or Travel Alerts currently in place for the Republic of Korea.

The American Citizens Services Unit of the Embassy of the United States in the Republic of Korea in Seoul provides services to U.S. citizens facing emergency and other crisis situations. Additionally, there is an American Presence Post in Busan (near Ulsan) that offers consular services by appointment.

UNIST Support Services

Our students will receive support from the UNIST International Center (UIC). Support includes placement assistance in UNIST dormitories, pre-departure information, international student orientation and activities, and the full range of services provided to regular undergraduates on campus.

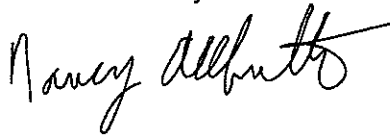
The on-site orientation for incoming international students (including exchange students) is comprehensive and takes place over three days. Topics include course registration, health and safety including information on the campus health center and sexual assault awareness, student organizations and involvement, campus computing and library use, visas/immigration, insurance, dormitory policies, transportation systems, Korean laws and enforcement, and Korean culture (including courtesy, traditional foods and eating styles, traditional and modern cultural issues, and more). Orientation also includes campus and city tours.

Regarding student life, UNIST offers over 60 student organizations that welcome

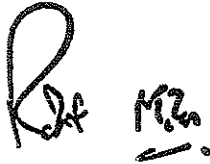
international student participation, and plentiful on-campus housing just steps from the student union, academic buildings, and campus library. Dormitories offer single and double rooms and feature on-site amenities including laundry, cafeteria, convenience store, postal center, gym and recreational facilities, social spaces, and more. Several rooms in each building are designated for students with accessibility needs. UNIST's Center for Healthcare and Counseling offers a variety of health care services, located in the Main Administration building on campus.

We are happy to provide any further information that you may need to evaluate this proposal.

Yours sincerely:



Dr. Nancy Albritton
Chair: Department of Biomedical Engineering



Dr. Bob Miles
Associate Dean: Study Abroad and International Exchanges