College of Health Solutions
Arizona State University

GRADUATE HANDBOOK

Master of Science (MS) in Biomedical Diagnostics

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Biomedical Diagnostics Student Handbook

This handbook is a guide for prospective and current graduate students in Biomedical Diagnostics (BMD). The handbook provides an initial resource for answers to questions about the program, but additionally students are also encouraged to consult with the Graduate Coordinator for any additional questions about the program.

Graduate College requirements define the basic policies for obtaining a degree from ASU, these policies can be found on the ASU Graduate College website located here. Additionally, BMD has several requirements which are identified in this handbook.

Biomedical Diagnostics

Diagnostics is at the center of health care innovation and is critical to personalized medicine. More than 60 percent of clinical decision-making uses biomedical diagnostics, and the industry employs more than 3.5 million people worldwide. Arizona State University (ASU) in collaboration with Dublin City University (DCU) have launched a Master of Science in Biomedical Diagnostics.

The Masters of Science in Biomedical Diagnostics has four core curricular areas that provide the foundation for the degree program:
  - Technology of Diagnostics: will explore instrument and assay development, biomedical engineering and diagnostic product development
  - Science of Diagnostics: will focus on underlying bioinformatics and bio-statistical analysis, clinical trial design, regulatory systems and the technology behind imaging, pathology, molecular and immunological testing platforms
  - Business of Diagnostics: will encompass public and private health care finance and reimbursement, along with personalized health care, and include the companion diagnostics
  - Application of Diagnostics: will be taught through case studies on critical diagnostics-related issues including bioethics, clinical utility, intellectual property, smart systems, as well as modality integration and systems analysis

Students will:
  - Benefit from innovative, cross-disciplinary curriculum taught by expert faculty who are leaders in the fields of engineering, technology, medicine, law, and business
  - Develop a comprehensive approach to health care
  - Garner experience through involvement in research or industry immersion programs
  - Gain a competitive advantage in the job market

Admissions
For a complete BMD MS application, students will be required to submit the following items:

- Official transcripts
- 2 Letters of Recommendation (Academic/Professional preferred)
- Personal Statement (1-2 pages)
- Resume/CV
- TOEFL/English Proficiency (for International Students) taken within 2 yrs

The BMD program processes admission twice each year (Fall/Spring). Priority Application Deadlines are listed below:

- ➢ Fall Start: July 20th
- ➢ Spring Start: November 30th

[NOTE: The priority application deadlines are in place to ensure students will be processed in time for the application term. However, the Faculty Admissions Committee will continue to review and accept MS applications as they are completed prior to the start of the term.]

Application Review Process: The Faculty Admissions Committee will review an application when ASU Graduate Admissions has received all application materials and the student is in review status. This status can be monitored in MyASU, official admission decisions will be e-mailed to the student.

Once admitted to the BMD graduate program, students have access to the BMI Graduate Student Blackboard site, where they will be able to find many of the materials in this handbook. Admitted students can access the site through their MyASU.

Funding Resources
Students should also visit the Graduate College web site and other links for student funding resources:

- ASU Financial Aid
- ASU Resources
- Federal Student Aid (Student Loans)
- Working at ASU

Student Responsibility
It is our expectation that all students enrolled in Biomedical Diagnostics will observe the policies expressed in this handbook as well as the academic policies of Arizona State University. Above all, we expect each student to maintain a high level of academic integrity. Each student must act with honesty and integrity, and must respect the rights of others in carrying out all academic assignments. The policies that our program abides by include the student academic integrity policy, the student code of conduct and the misconduct in research policy of ASU. We require students to review and observe these policies described in the Arizona Board of Regents Policy Manual available online.

Other information concerning administrative procedures and university policies can be viewed online through the Student Services Manual (SSM).

We expect our students to be accountable for any and all of the policies defined above. Violations of a Graduate College, Biomedical Diagnostics or Arizona State University policy will result in academic review and may consequently result in student disciplinary procedures.

Academic Integrity

Graduate students are expected to be ethical in their multiple roles as students, researchers, teachers or supervisors of undergraduate students, and representatives of the College and University. When in doubt about appropriate conduct, students should consult a faculty mentor to seek clarification. Breaches of academic integrity include, but are not limited to, the following:

- Engaging in any form of academic deceit, e.g., referring to materials, sources, or devices (camera phones, text messages, crib sheets, solution manuals, materials from previous classes, or commercial research services) not authorized by the instructor for use during an evaluation or assignment;
- Providing inappropriate aid to another student in connection with any evaluation or assignment;
- Engaging in plagiarism by using the ideas, words, or data of another person or persons without full and appropriate attribution;
- Engaging in plagiarism by claiming credit for the ideas, words, or data of another person or persons, or submitting work done by another as one's own;
- Failing to follow ethical procedures for research involving human subjects, such as violating participants' confidentiality, or failing to maintain confidential or sensitive research data in a secure location;
- Knowingly using data that do not meet appropriate standards for reliability and validity;
- Falsifying or misrepresenting hours or activities in relationship to an internship, externship, research assistantship, field experience, workshop, or service learning experience;
- Repeatedly failing to meet commitments and responsibilities, such as chronically missing deadlines, or failing to provide work promised to colleagues; and
- Behaving in a way that reflects poorly on the School, Institute, and University while conducting research or participating in community activities as a representative of the School.

The College of Health Solutions and Biomedical Diagnostics has a zero-tolerance policy for any form of academic malfeasance. Penalties for unethical behavior range from being placed on academic probation to dismissal from the program. Additional information about academic integrity policies of the University is available on the Student Rights and Responsibilities web site. Graduate College information regarding academic integrity is available on the Academic Integrity web site.

Campus and Location

Arizona State University is "One university in many places" — with many campuses throughout metropolitan Phoenix (and ONLINE) that create a federation of unique colleges and schools. The College of Health Solutions is located in downtown Phoenix. The faculty and staff associated with Biomedical Diagnostics are primarily located at the ASU Mayo Clinic Campus, additionally we also collaborate with ASU ONLINE.

> **ONLINE:** Classes are offered 100% ONLINE. Students will access course content through Blackboard. Students can access their courses in MyASU.

- ➢ **ASU and Mayo Clinic Campus:** Biomedical Diagnostics is primarily located at the Mayo Clinic Scottsdale Campus, at the Johnson Research Building, 13212 E Shea Blvd, Scottsdale, Arizona 85259, (located on the 2nd floor). BMD administration can be reached at phone number: 480-884-0220.
- ➢ **Downtown:** The College of Health Solutions is located at the ASU Downtown Phoenix campus, 500 North 3rd Street, Phoenix AZ 85004.

Tuition and Fees
For tuition expenses, students can view their student account on the *finances* tab in MyASU.

Students enrolled in the MS in Biomedical Diagnostics are applied a BMD program fee. For up to date information regarding tuition and fees, please visit the tuition and fee calculator.

BMD Faculty
BMD faculty can be found here.

Policy Against Discrimination, Harassment, and Retaliation
Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination, harassment, and retaliation by employees, students, contractors, or agents of the university based on any protected status: race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information. Additional information about this policy can be found here.

The Office of Student Rights and Responsibilities is responsible for reviewing and handling incidents involving students. The staff works closely with many other department and program staff on campus to ensure that all students can live, work, and learn in a mutually satisfying and secure environment. Students can get additional information about reporting an incident here.

Title IX
Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university.

Additional University Resources – ASU Online

[ASU Online Clubs](#)
[ASU Online Student FAQ](#)
[ASU Academic Integrity](#)
[Career and Professional Development Services](#)
[Bookstore](#)
[Counseling and Consultation](#)
[Disability Resource Center (DRC)](#)
[Graduate Admissions Office](#)
[Graduate College - Current Student Academic Resources](#)
[Graduate and Professional Student Association](#)
[Graduation Office (Registrar)](#)
[International Student Office](#)
[Library](#)
[MyApps](#)
[Online Support](#)
[Online Tutoring](#)
[Records (Academic)](#)
[Register For Your Classes](#)
[Residency](#)
[Scholarship Office](#)
[Student Accounts (Student Business Services)](#)
[Student Employment](#)
[Student Financial Assistance](#)
[Student Recreation Complex](#)
[Sun Card Office](#)
[Sun Devil Ticket Office](#)
[Testing Services, University](#)
[Top Tips on How to Succeed Online](#)

Biomedical Diagnostics Degree Requirements

Listed below are the ASU Graduate College and Biomedical Diagnostics policies for obtaining a degree in Biomedical Diagnostics from ASU. Additionally, Graduate College requirements define the basic policies for obtaining a degree from ASU. Students can access the policy manual here: Graduate Policies and Procedures.

Advising

To ensure that academic programs run as smoothly as possible, students should consult with their Graduate Coordinator (see *title page* for name and contact information), if there are additional questions regarding the policies outlined in this handbook, or the ASU Graduate College requirements. Students can schedule an advising phone appointment, or meet in-person (if the student is local or in the area). Additionally, ASU Online has success support staff that help connect students with the ASU Online and online resources. Any academic questions or concerns regarding grades, plan of study, academic probation, graduation, etc. should be addressed through your Graduate Coordinator.

Once admitted to the BMD graduate program, students have access to the BMD Graduate Student Blackboard site, where they will be able to find many of the materials in this handbook. Admitted students can access the site through their MyASU.

Satisfactory Academic Progress

All graduate students are expected to make systematic progress toward completion of their degree. This progress includes satisfying the conditions listed below, and achieving the benchmarks and requirements set by the individual degree programs. Each degree program should have in place policies for satisfactory academic progress. Students are responsible for verifying additional satisfactory progress policies as required by their degree program. If a student fails to satisfy the requirements of their degree program and/or the benchmarks outlined below, the student may be dismissed from their program based on the academic unit's recommendation to the Graduate College. The Dean of the Graduate College makes the final determination.

1. Graduate students must maintain a minimum 3.00 grade point average (GPA) to maintain satisfactory academic progress and to graduate. The minimum 3.00 GPA must be maintained on all GPA's (Plan of Study (iPOS) GPA, Overall Graduate GPA and Cumulative GPA). If either GPA falls below 3.00, the student must develop, with their advisor, an academic performance improvement plan that includes the conditions and timeframes for making satisfactory academic progress in their degree program.
    1. The iPOS GPA is calculated from all courses that appear on the student's approved iPOS.
    2. Cumulative ASU GPA represents all courses completed at ASU during the graduate career.
    3. The Overall Graduate GPA is calculated from all courses numbered 500 or higher that appear on the transcript, with the exception of courses counted toward an undergraduate degree at ASU (unless shared with a master's degree in an approved bachelor's/master's degree program); and courses identified as deficiencies in the original letter of admission. The student is considered to be on academic probation until the conditions specified in the academic performance improvement plan are met and both GPAs are above 3.00.

2. Satisfy all requirements of the graduate degree program.
3. Satisfy the maximum time limit for graduation from the student's graduate degree program (six years for master's, ten years for doctoral).
4. Doctoral students must comply with the five year time limit for graduation after passing the comprehensive examinations.
5. Successfully pass comprehensive exams, qualifying exams, foreign language exams, and the oral defense of the proposal/prospectus for the thesis or dissertation.
6. Successfully complete the culminating experience and, if required, the oral defense of the culminating experience.

Graduate students must stay continuously enrolled in their degree program. Failing to do so without a Graduate College approved *Request to Maintain Continuous Enrollment* is considered to be lack of academic progress and may lead to automatic dismissal of the student from the degree program. Persistent "W" and "I" grades during multiple semesters on a plan of study or transcript may reflect lack of academic progress.

Continuous Enrollment
Once admitted to a graduate degree program or graduate certificate program, students must be registered for a minimum of one credit hour during all phases of their graduate education, including the term in which they graduate. This includes periods when students are engaged in research, conducting a doctoral prospectus, working on or defending theses or dissertations, taking comprehensive examinations, taking Graduate Foreign Language Examinations, or in any other way utilizing university resources, facilities or faculty time.

Registration for every fall semester and spring semester is required. Summer registration is required for students taking examinations, completing culminating experiences, conducting a doctoral prospectus, defending theses or dissertations, or graduating from the degree program.

To maintain continuous enrollment the credit hour(s) must:
- Appear on the student's *Plan of Study,* OR
- Be research (592, 792), thesis (599), dissertation (799), or continuing registration (595, 695, 795), OR
- Be a graduate-level course.

Grades of "W" and/or "X" are not considered valid registration for continuous enrollment purposes. "W" grades are received when students officially withdraw from a course after the drop/add period. "X" grades are received for audit courses. Additionally, students completing work for a course in which they received a grade of "I" must maintain continuous enrollment as defined previously. Graduate students have one year to complete work for an incomplete grade; if the work is not complete and the grade changed within one year, the "I" grade becomes permanent. Additional information regarding incomplete grades can be found here.

Leave of Absence, Request to Maintain Continuous Enrollment
Graduate students planning to discontinue registration for a semester or more must submit a *Request to Maintain Continuous Enrollment form*. This request must be submitted and approved <u>before</u> the anticipated semester of non-registration. Students may request to maintain continuous enrollment without course registration for a maximum of two semesters during their entire program.

Having an approved *Request to Maintain Continuous Enrollment* by Graduate College will enable students to re-enter their program without re-applying to the university. Students who do not register for a fall or spring semester without an approved Request are considered withdrawn from the university under the assumption that they have decided to discontinue their program. Students removed for this reason may reapply for admission to resume their degree program; the application will be considered along with all other new applications to the degree program.

A student with a Graduate College approved *Request to Maintain Continuous Enrollment* is not required to pay tuition and/or fees, but in turn is not permitted to place any demands on university faculty or use any university resources. These resources include university libraries, laboratories, recreation facilities or faculty time.

Students will work with the BMD Graduate Coordinator to submit these form to Graduate College, forms are provided [here](#).

Pre-Admission Credits
Credit hours completed at ASU or from another regionally accredited US institution or international institution officially recognized by that country, before the semester and year of admission to an ASU graduate degree program, are considered pre-admission credits. With the approval of the degree program and the Graduate College office, students may include a maximum of 12 graduate-level credit hours with grades of "B" or better that were not used towards a previous degree. Preadmission credits must have been taken within three years of admission to the ASU degree program to be accepted. Official transcripts must be sent to Graduate Admission Services from the records office of the institution where the credits were earned.

[Note: The BMD program can only accept 6 pre-admission credits, applied as elective credits, if they are relevant to Biomedical Diagnostics and are reviewed and approved by our Academic Programs Committee]

Alternative Elective Courses
Elective courses other than those listed on the BMD pre-approved elective list cannot be used on an iPOS unless pre-approved. The following procedure should be followed for students who wish to take outside electives:
  ➢ The student should prepare a written request to the Graduate Coordinator which includes: A course syllabus, the semester the students plans to take the course, how the course enhances the students plan of study
  ➢ The Graduate Coordinator will work with the Academic Programs Committee (APC) to consider the elective coursework, and notify the student if approved

Grading and Grade Policies
The University Registrar assigns a general grading policy for all students. The instructor of a course has full discretion in selecting which grades to use and report from the available grading options. Grades are assigned as follows:

Grade	Graduate Definition	Value
A+		4.33
A	Excellent	4.00
A−		3.67
B+		3.33
B	Good	3.00
B−		2.67
C+		2.33
C	Passing	2.00
D	No Graduate Credit	1.00*
E	Failure	0.00*

Grade	Graduate Definition	Value
W	Withdrawal**	--
I	Incomplete	--
X	Audit	--
Y	Satisfactory	--
Z	Course in progress***	--
XE	Academic Dishonesty	0.00*
NR	No Report	--
EN	Failing Never Participated	0.00*

Although the plus/minus scale includes a grade of A+ with a value of 4.33, the cumulative GPA is capped at 4.00. Questions about the grade scales may be referred to the University Registrar Services at registrar@asu.edu
*This grade cannot be applied to a graduate degree but is included in the calculation of a grade point average.
**This grade is given whenever a student officially withdraws from a class.
***This grade is usually given pending completion of courses such as research, thesis, dissertation or practicum. All grades of "Z" must be changed to "Y" before graduation.

A grade of "P" (pass) in a 400 or higher level course may not appear on a Plan of Study. Grades of "D" or "E" cannot be used to meet the requirements for a degree although they are used to compute the grade point averages. A student receiving a grade of "D" or "E" must repeat the course in a regularly scheduled (not an independent study) class if it is to be included in the Plan of Study. However, both the "D" or "E" and the new grade are used to compute the grade point averages. Grades on transfer work will not be used in computing grade point averages.

Incomplete Grades
Students will work with the instructor to complete the Incomplete Grade Form and submit to the Graduate Coordinator. Ultimately the timeframe for completion is determined by the instructor, in conjunction with the student. Once coursework has been fulfilled, the earned grade will be assigned. If the student does not complete coursework within one calendar year, the incomplete will become permanent and the student will have to re-take the course, if required to meet the degree requirements.

Time to Degree Limit
Master's students: All work toward a master's degree must be completed within six consecutive years.

Academic Integrity Required Module
All new BMD students are required to complete the Academic Integrity Module, which is available for students on Blackboard (*ASU Academic Integrity Module Training*). Students must register for this course in Blackboard, review the presentation, and complete the Quiz by **September 1st** (for Fall starts) or **February 1st** (for Spring starts) with a passing score of 80% or higher. An additional reminder should be listed in MyASU under the priority task list. The BMD Graduate Coordinator will be

reviewing the course records to ensure all graduate students have completed the academic integrity modules successfully.

Plan of Study
The Interactive Plan of Study (iPOS) is a formal plan to meet degree requirements. The iPOS is an agreement that the work specified on the iPOS will be sufficient for the desired degree.

Students should strive to submit the iPOS online by the end of their first semester (MS students) and are required to submit it when 50% of the minimum credit hours for the degree being pursued have been completed.

A Plan of Study (iPOS) must be filed online via MyASU with Graduate College. It includes all courses to be taken, and a Faculty Advisor/Chair. For steps on how to submit your Plan of Study, please visit this [website](#).

> ➢ **Faculty Advisor/Chair:** In the iPOS system, students are required to submit a faculty advisor/chair. This person is automatically assigned for all BMD students, please use the Academic Program Director, Dr. George Runger as the Advisor/Chair in the iPOS system.

> ➢ **Change of Coursework**: If a student needs to change the coursework listed on the Plan of Study, the student will need to update the courses listed in the iPOS system and re-submit the iPOS for review. This process is required if you projected a course you did not take, or if you need to change courses listed. The iPOS will be routed electronically to the Graduate Coordinator for review and approval, then subsequent routing for auditing by the Graduate College.

An approved Plan of Study must be on file before a student can register for their final culminating experience (BMD 592 Research and BMD 593 Applied Project). Students should review the iPOS at the end of each semester, to ensure the courses listed on the iPOS match the student's transcript and that the courses meet the BMD plan of study course requirements.

Course and Graduation Requirements

The BMD Plan of Study is provided below for Fall and Spring starts. Core BMD courses are offered on a once-a-year basis. Thus, failure to complete a required graduate course during the appropriate semester of enrollment may delay graduation. Additionally course offerings are subject to change. Students should review the ASU class schedule for the course offerings each semester.

				BMD Plan of Study Fall Start	
Schedule	Term (Session)	Course	Credits	Title	Type
1st Semester	Fall (B)	BMD 502	3	Foundations of Biomedical Informatics Methods I	Core Course
	Fall (A)	BMD 667	3	Regulation of Medical Diagnostics	Core Course
	Fall (C)	BMD 513	4	Principles of Diagnostic Technology: Immunoassays (DCU course)	Core Course - **Must be taken in the 1st semester**
	*	*	3	Elective 1: Elective Options Below	**OR** students can take both Electives in the Spring Term
2nd Semester	Spring (A)	BMD 511	3	Health Economics, Policy and Payment Models	Core Course
	Spring (A)	BMD 514	3	Principles of Diagnostic Technology: Molecular Diagnostics	Core Course
	Spring (B)	BMD 592	2	Research	Core Course - Must be taken the semester prior to BMD 593
	*	*	3	Elective 2: Elective Options Below	Electives
Final Semester	Summer	BMD 510	3	Current Perspectives in Biomedical Diagnostics (DCU course)	Core Course - Must be taken after (BMD: 513, 502, 511, 514, 667)
	Summer	BMD 593	3	Applied Project (AP)	Culminating Course - Offered in Summer Sessions ONLY
			30 Credits		

			*Elective Options	
	Students Pick 2 Courses Listed Below (6 elective credits)			
Fall (B)	BMI 598	3	Biomedical Commercialization	
Spring (A)	BMI 598	3	Entrepreneurship in Biomedicine	
Spring (B)	BMI 598	3	Imaging in Diagnostics	
Spring (B)	BMD 550	3	Translational Bioinformatics	
Spring (B)	BMD 598	3	Biomedical Device Design Principles: Hands-on Work	

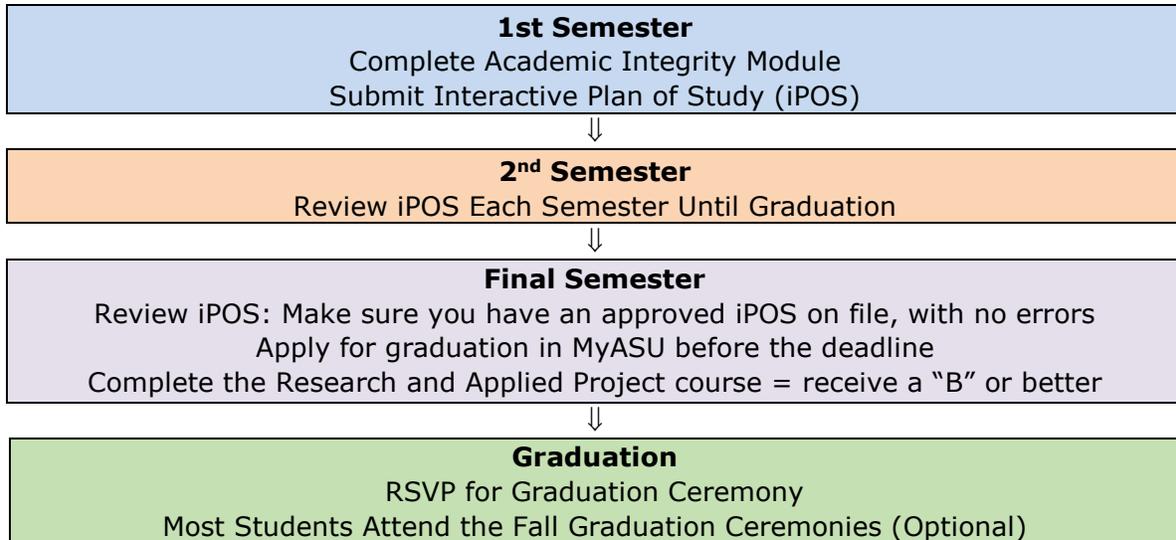| BMD Plan of Study Spring Start					
Schedule	Term (Session)	Course	Credits	Title	Type
1st Semester	Spring (C)	BMD 513	4	Principles of Diagnostic Technology: Immunoassays (DCU course)	Core Course - **Must be taken in the 1st semester**
	Spring (A)	BMD 514	3	Principles of Diagnostic Technology: Molecular Diagnostics	Core Course
2nd Semester	Fall (A)	BMD 667	3	Regulation of Medical Diagnostics	Core Course
	Fall (B)	BMD 502	3	Foundations of Biomedical Informatics Methods I	Core Course
	*	*	3	Elective 1: Elective Options Below	**OR** students can take both Electives in the Spring Term
3rd Semester	Spring (A)	BMD 511	3	Health Economics, Policy and Payment Models	Core Course
	Spring (B)	BMD 592	2	Research	Core Course - Must be taken the semester prior to BMD 593
	*	*	3	Elective 2: Elective Options Below	Elective
Final Semester	Summer	BMD 510	3	Current Perspectives in Biomedical Diagnostics (DCU course)	Core Course - Must be taken after (BMD: 513, 502, 511, 514, 667)
	Summer	BMD 593	3	Applied Project (AP)	Culminating Course - Offered in Summer Sessions ONLY
			30 Credits		

*Elective Options			
Students Pick 2 Courses Listed Below (6 elective credits)			
Fall (B)	BMI 598	3	Biomedical Commercialization
Spring (A)	BMI 598	3	Entrepreneurship in Biomedicine
Spring (B)	BMI 598	3	Imaging in Diagnostics
Spring (B)	BMD 550	3	Translational Bioinformatics
Spring (B)	BMD 598	3	Biomedical Device Design Principles: Hands-on Work

Advising Steps - BMD Master's Degree
In addition to the required coursework, the steps to achieve a MS in Biomedical Diagnostics are listed below. The program is designed to be completed in 1 year at the earliest. For Spring admission, the program will take 1 ½ years to complete.

1st Semester
Complete Academic Integrity Module
Submit Interactive Plan of Study (iPOS)

⇓

2nd Semester
Review iPOS Each Semester Until Graduation

⇓

Final Semester
Review iPOS: Make sure you have an approved iPOS on file, with no errors
Apply for graduation in MyASU before the deadline
Complete the Research and Applied Project course = receive a "B" or better

⇓

Graduation
RSVP for Graduation Ceremony
Most Students Attend the Fall Graduation Ceremonies (Optional)

Application for Graduation
Students should apply for graduation during the semester of planned graduation (Summer session) and no later than the date specified at the Graduate College website. Students can apply for graduation online through MyASU or in-person through the ASU Graduation Office, located in the Student Services Building.

Apply: All students must apply and be processed for graduation to receive their diploma. Students must check to make sure you have an approved iPOS on file and there are no course change requests needed. Any questions or concerns should be directed to the Graduate Coordinator.

Graduation Ceremony: Students that graduate in the Summer session have the option to participate and walk in the Fall ASU graduation ceremonies. There are no graduation ceremonies held during the Summer sessions. Information on Graduation Ceremonies can be found here.

- o **Convocation** is held for students graduating from the College of Health Solutions, details provided here.
- o **Graduate Commencement** is ASU-wide and is hosted by the Graduate College, details provided here.

Diploma: Information on the diploma can be found here. Diplomas are mailed approximately six to eight weeks after the degree conferral date. Students can review/manage their home address in MyASU.

Appendix I

BMD Course Descriptions

Core Courses:

BMD 513 (4 credits) Principles of Diagnostic Technology: Immunoassays (DCU course) The purpose of this module is to provide a detailed understanding of the theory and applications of advanced diagnostic assay systems and devices. In this module students will gain knowledge in immunoassay design and validation with particular attention to the manipulation of the immune system for disease recognition. This module assumes no former knowledge of immunology, but some knowledge would be advantageous.

BMD 502 (3 credits) Foundations of Biomedical Informatics Methods I Survey the methods and theories underlying the field of biomedical informatics. The course explores techniques in mathematics, logic, decision science, computer science, engineering, cognitive science, management science and epidemiology, and demonstrates the application to healthcare and biomedicine.

BMD 667 (3 credits) Regulation of Medical Diagnostics This course explores the regulatory environment for the development, marketing, access and interpretation of modern biomedical diagnostics. Students will explore the business environment of diagnostic firms, interactions with state and federal regulatory authorities, and how new types of diagnostics and business models challenge established approaches for safeguarding the validity and safety of new products and service.

BMD 514 (3 credits) Principles of Diagnostic Technology: Molecular Diagnostics Primer on nucleic acid structure, genome types, RNA, mutations, molecular diagnostics platforms, applications such as infectious disease, cancer, pharmacogenomics, risk management, current technologies such as DNA amplification, probes, DNA sequencing, mRNA expression levels, sample preparation, methods on the horizon.

BMD 511 (3 credits) Health Economics, Policy and Payment Models Provides a thorough grounding in selected microeconomic concepts and models that are relevant for the economic aspects of health care but also have more general applications. The concepts and methods are applied to a selected set of topics that include the public provision of health insurance, benefit-cost and cost effectiveness analysis, human capital models of investments in health, incentives and the legal approach to medical malpractice and current approaches to methods of payment for health care services.

BMD 510 (3 credits) Current Perspectives in Biomedical Diagnostics (DCU course) This course provides an overview of the Biomedical Diagnostics Industry covering research, policy and legal aspects of the field. Visiting speakers from ASU, Biomedical Diagnostics companies, and regulatory agencies will provide an overview of their specialty based on personal experience and case studies. Students will have the opportunity to engage in discussion boards with speakers and peers from Dublin City University.

Research & Culminating Experience:

BMD 592 (2 credits) Research Biomedical Diagnostics Independent study in which a student, under the supervision of a faculty member, conducts research that is expected to lead to a specific project such as a thesis or dissertation, report, or publication. Assignments might include data collection, experimental work, data analysis, or preparation of a manuscript.

BMD 593 (3 credits) Applied Project Students will complete an experiential learning experience as part of their applied project on a topic of relevance to the diagnostics field and their career interests. A one faculty member committee will work with the student to select an appropriate topic, supervise progress, and evaluate the project. Applied projects will demonstrate students' ability to apply skills and knowledge learned in coursework, use research methods appropriate to the field, and report and present results.

Elective Courses:

BMI 598 (3 credits) Imaging in Diagnostics This course gives an introduction to imaging informatics, covering imaging modalities (CT, MRI, Ultrasound, PET, etc), PACS (picture archiving and communication systems), RIS (radiology information systems), and the basic of image analysis and computer-aided diagnosis in medical imaging.

BMD 550 (3 credits) Translational Bioinformatics Provides an introduction to bioinformatics methods and applications used in the field of translational medical research. Topics include bioinformatics data acquisition and management, analysis methodologies, and applications.

BMD 598 (3 credits) Biomedical Device Design Medical Device Design is a hybrid class/lab where a mixture of lecture, hands on, demos, lab experiments are used to convey the breadth of medical devices in the medical diagnostic device industry. Classification of devices and function are explained and covered. Students will learn, reverse engineer and build simple devices as well as learn about the FDA, market, business and design side of these products.

BMI 598 (3 credits) Biomedical Commercialization This course is designed to provide students with a real world perspective of the challenges faced by those trying to commercialize new diagnostics technologies. Diagnostics are used (or not used) today. The course will focus on the current environment. Students will also have an opportunity to interact with recognized experts in the field of clinical laboratory, business, legal, reimbursement, regulatory, professional society and wearable device communities during guest lectures.

BMI 598 (3 credits) Entrepreneurship in Biomedicine The Entrepreneurship and Commercialization Specialty program is designed to produce the next biomedical entrepreneurs. These entrepreneurs will be uniquely positioned to identify new opportunities for innovation, by learning the process of developing a business plan, identifying clinical and market potential, and fundraising while initiating the process of invention, patenting, prototyping which lead to successful commercialization.