The purpose of this document is to inform the students of the policies and procedures contained in the Biomedical Informatics Program of the Department of Health Informatics. All students are required to abide by the rules and regulations of Rutgers University, the Rutgers Biomedical and Health Sciences and of the School of Health Related Professions as delineated in the Rutgers-SHRP Student Handbook [http://shrp.rutgers.edu/current_students/pdf/Handbook.pdf](http://shrp.rutgers.edu/current_students/pdf/Handbook.pdf) and of the Biomedical Informatics Program as specified in this Policies and Procedures Manual. This document is not intended to supersede the policies and procedures as outlined in the Rutgers-School of Health Related Professions Student Handbook, but to provide information more specific to the particular standards and procedures that are current at the time of publication as followed by the Department of Health Informatics for the Biomedical Informatics Program and its Degrees.
II. DEGREE PROGRAMS

CERTIFICATE PROGRAMS IN HEALTH CARE INFORMATICS & NANOINFORMATICS

The Health Care Informatics Certificate is a post-baccalaureate, 18 credits, degree program designed to quickly build up competencies in the field of Biomedical Informatics especially for those seeking a career change or advancement. The curriculum is unique in its framework as it provides a disciplinary core of knowledge and skills for all health professionals, and allows them to pursue a concentrated course of study in one of the three important areas of health care informatics: (a) hospital/health care management support systems, (b) clinical decision support systems, and (c) health information systems.

The Post-Baccalaureate Nanoinformatics Certificate Program is designed to quickly build up competencies in the field of Nanomedicine and Nanotechnology applications for Healthcare especially for those seeking a career change or advancement. It requires the successful completion of only 9 credits in the program.

To be admitted to the Program, the candidate must hold at least a Bachelor’s or higher degree from an accredited institution with a major in any field of health science, e.g., medicine, dentistry, nursing, allied health, public health, pharmacy, and biological sciences or an equivalent field of study. Graduates of the Certificate Program may transfer up to a total of twelve credits toward the Master of Science degree in Biomedical Informatics.

Competencies:

Upon completion of this program, the graduates will be able to:

- Use computers and information handling tools for a wide range of professional activities.
- Identify information needs in one's own work environment, select appropriate off-the-shelf technological solutions and make modifications necessary to accomplish both generic and health specialty related activities.
- Make strategic decisions about institutional policies and investments in: patient care and treatment systems, patient management systems, human resources and cost management systems, and professional education and training systems.
MASTER OF SCIENCE IN BIOMEDICAL INFORMATICS

The Master of Science in Biomedical Informatics program prepares students in the applications of computer and information sciences to support and manage all health care activities, including medical and health professions education, health sciences research, and management efforts directed toward solutions of problems in the delivery of health care, resource optimization and cost effectiveness. The course work includes the theoretical foundations plus the current range of applications of biomedical informatics within contemporary medical and health care delivery systems. The program emphasizes algorithms, design and use of efficient logic, computer-based methodologies and information technologies for cognition and representation of biomedical knowledge, management of health care/hospital systems, clinical decision making, biomedical imaging, design and development of interactive and intelligent teaching systems, and research solutions in biomedical sciences. In addition to core courses, electives and directed research projects, the student is able to pursue an in-depth study in one of the four tracks:

- Nanomedicine and Clinical Informatics
- Public Health Informatics
- Bioinformatics
- Hospital/Healthcare Management Informatics

All students complete at least 36 credits hours of which at least 30 hours must be formal course work. This includes: 18 credit hours of core courses, six credit hours in an area of emphasis/track, six credit hours of electives, and six credit hours of directed thesis or project.

Competencies:

Upon completion of the program, the graduates will be able to:

- Analyze information requirements for clinical decision making, health sciences education and training, and hospital/health care management.
- Design efficient and responsive system alternatives for hospital/health care management, clinical decision making and/or health professions education.
- Design, develop and implement computer-based (intelligent interactive/multimedia) teaching and learning systems to improve effectiveness of health sciences education and training.
- Manage health care, and medical information systems and technologies.
- Utilize cost-benefit/cost-effectiveness analysis methodologies.
- Utilize concepts and tools of artificial intelligence, expert systems, and probabilistic models to improve decision making.
- Evaluate and improve the effectiveness of clinical, educational, and/or management information systems.
PH.D. IN BIOMEDICAL INFORMATICS

The Ph.D. degree program in Biomedical Informatics represents an articulated program of study designed primarily to serve health care practitioners, students who have completed MS degree in Biomedical Informatics, Computer Science, Biomedical Engineering, and students who hold Master's or other advanced degrees in the health related professions, and basic sciences. The curriculum consists of a minimum of 61 credits which include: (a) core courses (b) specialization or track courses in the four tracks listed below, and (c) 36 credits of original research work leading to a dissertation.

- Nanomedicine and Clinical Informatics
- Consumer/Patient Care Informatics
- Bioinformatics
- Hospital/Healthcare Management Informatics

The program is designed to prepare individuals for informatics leadership positions in the schools of health sciences, teaching hospitals, health care organizations, pharmaceuticals, biomedical research laboratories, and government agencies; and to educate students to create, implement and evaluate health care informatics algorithms, technologies, and decision support tools for improving clinical practice, health care delivery and management, research and education. Thus, expanding and advancing the science and methods of biomedical informatics.

Competencies:

The Ph.D. degree program is built upon the MS in Biomedical Informatics degree program. The graduates of the MS degree in Biomedical Informatics demonstrate "knowledge utilization" competency, whereas the graduates of the Ph.D. program will possess "knowledge generation" competency. Upon successful completion of the Ph.D. program, the graduates will:

- Demonstrate comprehensive knowledge of various scientific advances in the discipline.
- Utilize theories and tools of biomedical informatics to solve problems in health care.
- Design and conduct original research to generate knowledge in the field of biomedical informatics.
- Demonstrate competency in knowledge engineering by using theories and methods of data structure, algorithms, and programming.
- Demonstrate competence in both scholarly and technical writing.
- Provide leadership in the applications of information technology in all aspects of health care.
- Demonstrate instructional skills.
III. PROGRAM GOALS

The overall goal of our academic programs is to develop such competencies in the students that put our students in command and control of development and evaluation of new methodologies for acquiring, representing, processing, and managing knowledge and data related to health, health care, and the biomedical sciences. Our students under the supervision of our faculty investigate novel computational, statistical, organizational, and decision-making methods to support information-intensive problems in all areas of biomedicine.

The BINF programs are directly related to the scope and mission of the Rutgers-School of Health Related Professions and are in congruence with the goals and recommendations in the Statewide Plan for Higher Education. The SHRP has historically assumed significant leadership responsibilities for the preparation of health professionals in the State of New Jersey. The provision of the Certificate, Master’s and PhD programs in Biomedical Informatics is a logical extension of the SHRP’s special mission, which is to provide opportunity for an integrated multidisciplinary health sciences education which will enable students to advance in their professional careers. The curriculum of an academically sound Certificate, M.S. and PhD degrees in Biomedical Informatics are based on knowledge and experience derived from the processes in medicine and health care.
IV. ANTICIPATED PROGRAM OUTCOMES

The field of biomedical informatics is concerned with the design and application of tools and methodologies of communication and information technology which can contribute to improved acquisition and better utilization of health sciences knowledge for solution of concrete health problems and better health care. Thus, the course work includes the theoretical foundations as well as the current range of applications of biomedical informatics within contemporary medical and health care delivery systems.

The principal objective of the biomedical informatics graduate program is to provide professional, graduate level training in a field that combines the medical and health sciences with the biomedical information technologies. The MS and PhD programs in BINF have been designed for individuals who wish to undertake an in-depth study of biomedical informatics. The programs emphasize cognition and representation of biomedical knowledge, approaches to management of medical/hospital information systems, computer-based decision-support systems, design and development of computer-based biomedical teaching systems, and research in biomedical informatics.

The students will be able to apply theories and techniques of conversion of scientific data into biomedical knowledge, with a thorough understanding of the processes of conversion and the properties of information as applied to the context of health and medical professions. Examples of such contexts include: health services networking, patient management and registration systems; laboratory automation and hospital/healthcare database management systems; physiological monitoring; biomedical signal processing, image analysis and visualization; computer-assisted diagnosis and decision support systems, and pattern recognition; medication and drug interaction, patient care protocols and therapeutic research and support systems; and medical and health related professions education and research systems.

The graduates of this program will be prepared to analyze medical and health care information requirements; design system alternatives; manage health and medical information systems and technology; identify and implement user training strategies; evaluate the effectiveness of clinical and/or management information systems in patient care; and contribute creatively to basic or applied projects in biomedical information science. Since the program's focus is on biomedical informatics competence within health care settings, the graduate will be invaluable resource to the health care delivery systems.

Program completion will provide for a wide range of career opportunities in every health care facility, laboratory, pharmaceutical company, private and governmental agency, and medical, dental, nursing and health professions colleges in the nation, which utilizes modern information technology.
V. ADMISSIONS & PROGRAM REQUIREMENTS

Healthcare Informatics Certificate & Nanoinformatics Certificate

The Post-Baccalaureate Healthcare Informatics Certificate Program is designed to quickly build up competencies in the field of Biomedical Informatics especially for those seeking a career change or advancement. It requires the successful completion of only 18 credits in the program. Students pursuing the Healthcare Informatics certificate program can opt to apply for the Master's in Biomedical Informatics program anytime during the tenure of their certificate program. Such students should consult with the Chair of the Department as to the application process to help them migrate from the Certificate to the Master's program.

The Post-Baccalaureate Nanoinformatics Certificate Program is designed to quickly build up competencies in the field of Nanomedicine and Nanotechnology applications for Healthcare especially for those seeking a career change or advancement. It requires the successful completion of only 9 credits in the program. Students pursuing the Nanoinformatics certificate program can opt to apply for the Master's or PhD (subject to their having a Master's Degree in a relevant field) in Biomedical Informatics program anytime during the tenure of their certificate program. Such students should consult with the Chair of the Department as to the application process to help them migrate from the Certificate to the Master's program.

The specific entrance requirements include:

• Completed applications form with the SHRP’s application fee.

• Three (3) letters of recommendation. Professors and/or individuals directly responsible for supervising the applicant, attesting to the candidate’s potential success in the program, should write these letters.

• Official transcripts(s) of previous collegiate work or last earned degrees.

International Students and TOEFL: In addition to the requirements stated above international students are required to provide evidence of English language proficiency by submitting Test of English as a Foreign Language (TOEFL) examination scores. Acceptable scores for TOEFL are as follows: 550 and above for paper based test and 79-80 for the internet based (iBT) examination.

Advisement: Each entering student is assigned a faculty advisor who assists the student in initial course selection appropriate to the career goals of the student.
M.S In Biomedical Informatics

The Master’s Degree in Biomedical Informatics provides for a wide range of career opportunities as managers, specialists, scientists, researchers and educators in various health care settings including: hospitals and health care facilities, laboratories, pharmaceutical companies, insurance, private and governmental agencies. The Master’s Degree program requires 36 credits (a duration of 18 months to 2 years) to complete. The details are provided below.

Program Entrance Requirements for Master's Degree in Biomedical Informatics:
Applicant for admission to the Master's Degree in Biomedical Informatics must hold a bachelors degree from an accredited institution in the US or its equivalent with a major in any field of health sciences (including medicine, dentistry, allied health, nursing, public health, pharmacy), or biological sciences, computer science, engineering or an equivalent field of study. Besides the requirement of the bachelors degree, the student must also satisfy all entrance requirements of Rutgers-SHRP.

These requirements include:

- Completed applications form with the SHRP’s application fee.
- Three (3) letters of recommendation. Professors and/or individuals directly responsible for supervising the applicant, attesting to the candidate’s potential success in the program, should write these letters.
- Official transcripts(s) of previous collegiate work or last earned degrees.
- Personal statement describing interest and commitment to the program.

Note: No GRE is Required to enrol in the M.S program.

International Students and TOEFL: In addition to the requirements stated above international students are required to provide evidence of English language proficiency by submitting Test of English as a Foreign Language (TOEFL) examination scores. Acceptable scores for TOEFL are as follows: 550 and above for paper based test and 79-80 for the internet based (iBT) examination.

Advisement: Each entering student is assigned a faculty advisor who assists the student in initial course selection appropriate to the career goals of the student, election of a project advisor and an advisory on project.

Program Requirements:

All students complete at least 36 credits hours of which at least 30 hours must be formal course work. This includes:

1. 18 credit hours of core courses,
2. Six credit hours in a specialization track,
3. Six credit hours of electives, and
4. Six credit hours of directed thesis or project.
• The Master's Directed Thesis/Project related details can also be viewed by visiting the following URL:
  ▪ http://shrp.rutgers.edu/dept/informatics/current_students.html

There are four specialization tracks available to the Master's degree student, namely:

• Nanomedicine and Clinical Informatics
• Consumer/Patient Care Informatics
• Bioinformatics
• Hospital/Healthcare Management Informatics

Students successfully completing the program will be granted the Master of Science degree in Biomedical Informatics.

Full-time students may complete the MS degree in 18 months, but will usually require two years. Part-time students may take three to five years to complete the degree.
Ph.D. In Biomedical Informatics

Graduates with a PhD in Biomedical Informatics will develop, implement and evaluate informatics algorithms and technologies for improving health care delivery and management. Accordingly the PhD program prepares individuals for informatics leadership positions such as chief information officers (CIOs), scientists and directors of research, managers of hospital and laboratory information systems, and faculty members in various health sciences educational institutions. The PhD degree program requires 61 credits to complete. Students can select one of the following areas of specialization:

- Nanomedicine and Clinical Informatics
- Public Health Informatics
- Bioinformatics
- Hospital/Healthcare Management Informatics

Full-time students may complete the program in three to five years while Part-time students may take up to ten years to complete the PhD degree.

Program Entrance Requirements for Ph.D.:
Applicant for admission to the Ph.D. Program in Biomedical Informatics must hold a Masters degree from an accredited institution in the US or its equivalent with a major in any field of health sciences (including medicine, dentistry, allied health, nursing, public health, pharmacy), or biological sciences, computer science, engineering or an equivalent field of study. The applicant must also satisfy all entrance requirements of Rutgers-SHRP. These requirements include:

- Completed applications form with the SHRP’s application fee.
- Three (3) letters of recommendation. Professors and/or individuals directly responsible for supervising the applicant, attesting to the candidate’s potential success in the program, should write these letters.
- Official transcript(s) of previous collegiate work or last earned degrees.
- Personal statement describing interest and commitment to the program.

Note: No GRE is Required to enrol in the PhD program.

International Students and TOEFL: In addition to the requirements stated above international students are required to provide evidence of English language proficiency by submitting Test of English as a Foreign Language (TOEFL) examination scores. Acceptable scores for TOEFL are as follows: 550 and above for paper based test and 79-80 for the internet based (iBT) examination.

Advisement: Each entering student is assigned a faculty advisor who assists the student in initial course selection appropriate to the career goals of the student, selection of a project advisor and an advisory committee for the directed thesis or dissertation project.
**Academic Requirements**: The academic requirements for the Doctor of Philosophy in Biomedical Informatics are as follows:

1. A total of 61 Credits made up of 24 credits of courses (i.e. 8 courses) and 36 credits of Dissertation Research and 1 credit of the Graduate Colloquium (seminar).
2. The 24 credits of courses consist of 4 Core Courses (out of a choice of Six Core courses) all at 5000 level and 2 Track/Specialization Courses (should be at the 7000 level) and 2 more Elective Courses (should be at 7000 level). The list of courses providing the choices for the core, the track and the electives can be viewed in the PhD Program Requirements for Graduation;
3. Qualifying Examination: Students must pass a doctoral qualifying examination, which is designed to test the fundamental knowledge of students in the area of biomedical informatics theory and systems, health care systems, and selected Biomedical Informatics courses related to the area of specialization. Admission to the doctoral program does not imply candidacy for a degree. Registration for dissertation research will be permitted to those who have passed the qualifying examination.
4. 36 credits of dissertation research culminating in submission of the final draft of the dissertation. In addition to the dissertation, submission of at least one research paper for publication in a peer reviewed journal.
5. Registering for the BINF7910 Biomedical Informatics Colloquium / Seminar once during the sojourn of the PhD program constitutes the remaining 1 credit making up the total number of credits to be 61 credits. Besides registering once for BINF7910 the student is also required to attend the colloquium each semester during the length of his/her PhD program.
7. The PhD Dissertation related details can also be viewed by visiting the following URL: [http://shrp.rutgers.edu/dept/informatics/current_students.html](http://shrp.rutgers.edu/dept/informatics/current_students.html)
VI. ADDITIONAL POLICIES & PROCEDURES

Advisement: Each entering student is assigned a faculty advisor who assists the student in initial course (and track) selection appropriate to the career goals of the student, selection of a thesis advisor and an advisory on the thesis. Furthermore the faculty advisor helps the student in:

- Providing information about the profession of biomedical informatics
- Getting information on how to add or drop a course, or register
- Help in deciding whether to add or drop a course
- Getting information about degree requirements
- Finding out about research and career opportunities
- Getting copies of academic forms and publications
- Receiving timely advice on the proper sequencing of required courses such that all prerequisites are observed.
- Resolving course scheduling problems
- Recommendations for courses to satisfy the elective requirements.
- Help in formulating career objectives
- Assistance in dealing professional issues
- Discussing independent study projects
- Learning about graduate school
- Getting recommendation letters

Faculty advisors are generally available during posted office hours and at other times by appointment in addition to the assigned times.

Program retention: Retention in the 3 graduate programs is based on the following criteria:

- maintenance of GPA at 3.0 or better;
- obtain no more than one course failure for the duration of the program;
- retake a failed course only once and attain a C or better grade;
- and adherence to the policies of the Rutgers-SHRP and affiliating institutions and health care agencies.
- Student being ‘in-status’ each semester of his/her study – a student is considered to be ‘in-status’ if they are either registered in one or more courses, with no financial and/or immunization holds, on approved leave of absence or on maintaining matriculation status. Failure to be in any of the three states results in an administrative withdrawal and entails the student to seek readmission to join the program again.

Details on the policies and procedures pertaining to course schedules and registration, grading, tuition and fees, student health and resources, readmission, leave of absence, maintaining matriculation can be found in the Student Handbook (http://shrp.rutgers.edu/current_students/pdf/Handbook.pdf pages 11 to 14, 21, 22, 26 to 33).

Non Matriculated Status: Students with baccalaureate degrees who do not plan to seek admission or who are awaiting admission in the Master of Science, Ph.D. or Health Care
Informatics and Nanoinformatics Certificate programs may request permission to enroll as non-matriculated status students. These students can take up to 9 credits in the program. Permission to take courses is contingent upon fulfillment of the specific course prerequisites, availability of spaces, and approval of the Program Director. The process of application for the Non Matriculate status registration is through the Enrollment Services and more details can be found at: [http://shrp.rutgers.edu/prospective_students/index.html](http://shrp.rutgers.edu/prospective_students/index.html).

**Special Needs**
Students with special needs should notify the SHRP Disability Compliance Coordinator of the need for necessary modifications at the beginning of the semester. Such modifications must be documented with and approved by the Rutgers School of Health Related Professions. Students should refer to the Student Rights and Responsibilities section of the SHRP Student Handbook (Pages 11 to 25) or to the Office of Student Affairs and Services at [http://shrp.rutgers.edu/current_students/shrp_oss_home.html](http://shrp.rutgers.edu/current_students/shrp_oss_home.html).

**Course Evaluations:**
Course and Instructor Evaluations will be deployed during the end of every course in all the programs. One component of the evaluations will be on the content itself – to get a measure of the knowledge and skills gained in undertaking the course whereas the rest of the components of the evaluations will be on the quality of teaching, the environment, the mode of delivery and timeliness of assessment and feedback as also the utilitarian aspects of the course for the future.

**Transfer of Credits:**
Students who successfully graduate from our MS degree and who are admitted into our PhD degree program will receive a transfer of 12 credits and these will be for the common core courses present in both the curricula. Students who successfully graduate from the B.S. in Health Information Management and who are admitted into our MS degree program will receive a transfer of 9 credits and these will be for the common courses present in both the curricula. Besides these two structured transfer of credits processes it is possible for students from very closely related MS degree programs (from other US universities) and who are admitted into our PhD degree program may receive a transfer of up to a maximum of 9 credits and the exact number (if any) will be subject to the approvals of the Program Director and the Associate Dean for Academic Services. More information on this and Portfolio Assessment can be found in the Student Handbook ([http://shrp.rutgers.edu/current_students/pdf/Handbook.pdf](http://shrp.rutgers.edu/current_students/pdf/Handbook.pdf) page 33).

**Grading Determination:**
The grade will be based on a 100 point scale. A student must achieve an aggregate score of 70% or higher.

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<thead>
<tr>
<th>Weighted Average of All Requirements</th>
<th>Final Letter Grade</th>
<th>Grade Quality Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90 or better</td>
<td>Excellent</td>
</tr>
<tr>
<td>B+</td>
<td>86 to 89</td>
<td>Very Good</td>
</tr>
<tr>
<td>B</td>
<td>80 to 85</td>
<td>Good</td>
</tr>
<tr>
<td>C+</td>
<td>76 to 79</td>
<td>Average</td>
</tr>
<tr>
<td>Grade</td>
<td>Score Range</td>
<td>Description</td>
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<td>-------</td>
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</tr>
<tr>
<td>C</td>
<td>70 to 75</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>F</td>
<td>less than 70</td>
<td>Failing</td>
</tr>
</tbody>
</table>

Additional information on the Grading Policy and documents (with regard to Academic Standing, Probation, Examination Policies etc.) can be found in the SHRP Student Handbook ([http://shrp.rutgers.edu/current_students/pdf/Handbook.pdf](http://shrp.rutgers.edu/current_students/pdf/Handbook.pdf), Page 22).

**Student Rights, Responsibilities, Use of IT and Services:**

**Honor Code and Academic Integrity:**

The faculty of Rutgers-School of Health Related Professions including the Department of Health Informatics believe that students must observe and support high standards of honesty and integrity in all aspects of education, practice and research. For this reason, all matriculated and non-matriculated students in this course are expected to abide by the School's Faculty/Student Honor Code and accept responsibility to help ensure that these standards are maintained by reporting violations of the Honor Code observed in others.

More procedural information pertaining to Student Conduct, Course Registration, Requirements for Graduation and such (including many that are included in this document as well as the Student Handbook) can be found at: [http://shrp.rutgers.edu/current_students/index.html](http://shrp.rutgers.edu/current_students/index.html)

If you have any questions, concerns or require clarifications please do not hesitate to contact us.

**Contact Information:**

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