

M.S. in Biotechnology Innovation and Computation (MSBIC)

Graduate Student Policy Handbook 2014-2015

The Program

The M.S. in Biotechnology Innovation and Computation (MSBIC) is a professional master's program offered jointly by the Lane Center for Computational Biology (LCCB) and the Language Technologies Institute (LTI) in the School of Computer Science at Carnegie Mellon University. This program seeks to educate students in the innovative use of computing technologies to create solutions in the biotechnology sector. As the biotechnology industry matures there is a great need for students who can envision, design, plan and deliver solutions that integrate computing technologies (such as text mining, network analysis, and machine learning) into innovative applications and effective business solutions for biotechnology R&D.

The curriculum is designed for students who have a strong background in biology and/or computer science with an interest in working at the interface of these two disciplines. The integrated curriculum includes course work and case studies with the emphasis in the application of computing technologies in realistic business environments. As part of their ongoing course work, students complete a series of system and business development objectives as they tackle current real-world problems. Industry leaders participate in many of the courses, both as presenters and as students' mentors.

Introduction

The Language Technologies Institute (LTI) and the Lane Center for Computational Biology (LCCB) have prepared this statement of policies, program requirements, guidance, process and procedures for students in the M.S. in Biotechnology Innovation and Computational (MSBIC) program. A copy of this handbook is also available online at:
<http://bic.cs.cmu.edu/index.html>

The University Student guide, The Word, which details university-wide policies, is also available online at www.cmu.edu/student-affairs/theword.

Additional resources specific for graduate students can be found at
<http://www.cmu.edu/graduate/policies/>

It is the student's responsibility to be familiar with all policies related to their educational and community experience at Carnegie Mellon University.

Program Contacts

John D. Vu
Director, MSBIC,
Advising Committee, MSBIC Program
Distinguished Career Professor of Computer Science
GHC 6411
412- 268-8812
jvu@cmu.edu

Ravi Starzl
Co-Director,
Advising Committee, MSBIC program
System Scientist
GHC 6403
412-268-8425
ehn@cs.cmu.edu

Karen Thickman
Co-Director,
Advising Committee, MSBIC program
Assistant Teaching Professor
GHC 7403
412-268-7876
krthickman@cmu.edu

Jaime Carbonell
Department Head, Language Technologies Institute
Allen Newell Professor, Computer Science
GHC 6721
412-268-7279
jgc@cs.cmu.edu

Robert F. Murphy
Department Head, Lane Center for Computational Biology
Ray and Stephanie Lane Professor of Computational Biology and Professor of Biological
Sciences, Biomedical Engineering and Machine Learning
GHC 7723
412-268-3480
murphy@cmu.edu

THE CARNEGIE MELLON STATEMENT OF ASSURANCE:

Carnegie Mellon University does not discriminate in admission, employment, or administration of its programs or activities on the basis of race, color, national origin, sex, handicap or disability, age, sexual orientation, gender identity, religion, creed, ancestry, belief, veteran status, or genetic information. Furthermore, Carnegie Mellon University does not discriminate and is required not to discriminate in violation of federal, state, or local laws or executive orders.

Inquiries concerning the application of and compliance with this statement should be directed to the vice president for campus affairs, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, telephone 412-268-2056.

Obtain general information about Carnegie Mellon University by calling 412-268-2000.

Section 1. Degree Attainment

COURSE GRADE AND GPA REQUIREMENTS

To receive the M.S. degree, all students must take and successfully complete at least 144 units of coursework. All required Core Courses must be completed with a grade of B or better. For the Knowledge Area Courses, students must maintain a B average. No grade lower than C shall be used for credit applied toward graduation.

Students are required to repeat any required course that they have completed with a grade less than the required minimum, preferably at the next offering. (Please note that Core courses and Knowledge courses are only offered once per year.) Students will be allowed to retake a required course only once. If a student fails in the second attempt, he or she will be dropped from the MSBIC program.

If a student fails an elective course she or he will need to repeat the same or take a substitute course (equivalent course approved/recommended by their advisor).

All grades count towards the program GPA, except for repeated courses, in which case the final grade replaces the previous grade. Students who do not achieve the required minimum grade in a required course, who elect to take an incomplete in a required course, or whose cumulative grade point average is below a B (3.0), will be placed on academic probation. Students on probation are not eligible to graduate. Students who are placed on academic probation shall receive written notice of this finding, including a list of measures that need to be taken to be removed from academic probation. A student on academic probation for two consecutive semesters will be dropped from the program.

COURSE REQUIREMENTS:

Students are required to take and successfully complete:

1) The Core Courses (72 units):

- 02-651 - New Technology & Future Market – (12 units)
- 11-695 - Competitive Engineering (12 units)
- 02-654 – Biotechnology Enterprise Development (12 units)
- 11-691 - Capstone Project (36 units)

2) The Knowledge Area Courses (48 units):

- 11-693 - Software Methods for Life Science (12 units)
- 11-675 – Big Data systems in Practice (12 units)
- 10-601 – Machine Learning (12 units) OR
- 05-834 - Applied Machine Learning (12 units) OR
- 11-663 – Machine Learning in Practice (12 units)
- 02-750 - Automation of Biological Research (12 units) OR
- 02 -712 – Computational Methods for Biological Modeling and Simulation (12 units)

In the event that a course is not available, a course covering equivalent material with a similar degree of difficulty may be substituted with the permission of their advisor.

3) Electives:

A minimum of 24 units of LTI or LCCB courses must be taken. Examples include but are not limited to:

Algo and Programming for Scientist

- 02-712 – Computational Methods for Biological Modeling (12 units)
- 02-710 – Computational Genomics (12 units)
- 02-721 – Algorithms for Computational Structural Biology (12 units)
- 02-730 – Cell and Systems Modeling (12 units)
- 02-713 – Algorithms and Data Structure for Scientist (12 units)
- 02-652 – Fundamentals of Biotechnology (12 units)
- 11-642 – Search Engine & Web Mining (12 units)
- 11-691 – Software Project Planning & Management (6 units)
- 11-683 – Biotechnology Outsourcing & Growth (6 units)
- 11-676 – Big Data Analytics (12 units)
- 11-741 – Information Retrieval (12 units)
- 11-755 – Machine Learning for Signal processing (12 units)

A student who wants to take a relevant course outside of the LTI and LCCB must obtain permission by writing and getting approval in writing from the MSBIC Director at least two weeks before registration.

4) Supporting courses:

Students who want to improve their foundation in either Biology or Computer Science may want to take supporting courses such as Applied Cell and Molecular Biology 38-709 or Modern Biology 03-121, or Fundamentals of Programming 15-112 or Principles of Imperative Computing 15-122. Units for these supporting courses will not count toward the 144 units for graduation.

The MSBIC course offerings are available at bic.cs.cmu.edu/curriculum.

The university's complete Schedule of Classes can be found at www.cmu.edu/hub/courses.

Master's Students Statute of Limitations Policy

Students will complete all requirements for the master's degree within a maximum of four years from original matriculation as a master's student, or less if required by a more restrictive department, school or college policy. Additional information can be found at <http://www.cmu.edu/policies/documents/MastersStudentStatuteLimitations.html>

ADVISING

Student Advising

Every MSBIC student will be assigned an advisor. Before the course registration period each semester, students must meet with their advisor to obtain approval for their course selection. New students will be given instructions to register for their classes during the MSBIC orientation.

Monitoring Progress

The advisor meets with the student at least twice a year, providing guidance and monitoring the student's overall progress.

M.S. RESEARCH

Students who are interested in research for academic credit can take M.S. Research 02-700. Up to 12 units may be taken to gain some research experience; these will count toward the 144-unit total. In addition, the student must write a paper and submit it for publication and present it in a LTI or LCBC colloquium.

Typically, students contact faculty directly to learn about available research opportunities. It is strongly advised that students wait until their second semester to begin research. MSBIC students are not eligible for research assistantships or financial compensation for the research work

INTERNSHIP

Students are encouraged to seek an internship in an organization during the summer between the first and second years of the program. Although it is not a requirement, an internship will provide students with the opportunity to apply the knowledge and technical skills learned during the first year of the program, to gain insight into new technologies and future market needs to further their experience and develop a strong context for the second-year concentration coursework.

Students are encouraged to intern with an organization that corresponds to your individual area of interest and career goals such as Software, Pharmaceuticals, Biotechnology, and Startups etc.

Students who are interested in doing an internship can take the Computational Biology Internship 02-601 or LTI practicum 11-935 for 36 units; Students must receive approval for their internship plans from the MSBIC Director.

International students who secure paid internships outside of Carnegie Mellon must register for either 02-601 or 11-935 and Curricular Practical Training (CPT). The Office of International Education (OIE) oversees CPT registration. To obtain CPT students need the offer letter spelling out employment dates, work hours, and amount of wages or stipend.

Students are encouraged to contact the MSBIC Director or their advisor for assistance with their internship plans (i.e. resume, cover letters and making contacts).

NOTE: Students are personally responsible for securing a suitable internship. CMU Career and Professional Development Center will provide assistance in their search through counseling, workshops, and internship opportunity listings in CareerNavigator. We strongly suggest students begin the internship search beginning in the Fall of your first year. Some internship opportunities have application deadlines in the Fall, so by starting your search early, you won't miss out on these internships. CMU Career and Professional Development Center will assist students with the internship search, but does not match students with employers; obtaining an internship is students' responsibility.

The following steps are recommended to ensure a successful internship outcome.

September/October

- Meet with your advisor to discuss your interests and plan your internship search.
- Review the internships of previous students. We also encourage you to speak informally with second year students who can offer first-hand information about their internships.
- Attend the Technical Opportunities Conference (TOC) at CMU for exposure to potential employers for internships.

November/December

- Begin researching organizations and internship opportunities. Pay close attention to organizations that have established internship programs and their deadlines.
- Attend the workshops to perfect your resume, hone your interviewing skills, and gain knowledge about the internship search process.

January/February

- At this point you should have a "short list" of organizations at which you would like to intern. This list can include organizations that have established internship programs as well as those that interest you without formal internship programs.
- Update your resume with relevant academic projects, coursework, etc.
- Begin utilizing your personal network for internship leads as well as checking organization's websites for internships.
- Make contact with employers, sending resumes and applications, and initiating internship interviews in person or by phone.
- Attend Network Nights and talk to alumni about internship opportunities in their organization. They are an excellent resource for learning more about a particular organization, career field or employment opportunity. You can find alumni in the Alumni Directory, Alumni Career Advisor Network, and Carnegie Mellon Alumni LinkedIn Network.

March/April

- At this point you should have secured an internship or be interviewing with various organizations.
- Prepare a back-up plan if your first choice internships do not work out.
- Attend relevant Network Nights and Career Fairs by CMU.
- If you are an F-1 Visa student, you must apply for CPT.
- MSBIC students should enroll in internship 02-601 or 11-935 for 36 credits. You will not have to pay tuition for this course.

COURSE REGISTRATION

Status

All Students must be registered for at least 36 units during each semester. Any questions about registration should be directed to the Enrollment Services (the HUB). Note that International students are required to be registered as full-time students, minimum 36 units.

Academic Calendar

The Academic Calendar can be found at <http://www.cmu.edu/hub/calendar.html> All dates pertaining to registration, add/drop deadlines, university holidays and more can be found there.

Online Registration

All new students will be able to register for their classes during the MSBIC orientation session. After that, students will register following the schedule set by the HUB. Note that students must meet with their advisor to obtain approval for their course selection. Registration information is available at www.cmu.edu/hub/online_services. Online registration is done with an Andrew ID at www.cmu.edu/hub/sio

Students must register for at least 36 units per semester.

Pass/Fail Courses

With approval of their advisor, a graduate student may elect to take a course pass/fail (P/F). By the deadline for changing a course to P/F, the student must fill out the Pass/Fail Approval Form and receive permission from the course's instructor. Classes taken P/F cannot be used to fulfill graduation requirements, and P/F status is irrevocable. (P/F form can be found at: www.cmu.edu/hub/forms)

Auditing a Course

With approval of their advisor, a graduate student may audit a course by obtaining permission of the instructor or teaching department and completing the Course Audit Approval Form. Audited classes are not taken for credit and cannot be used to fulfill graduation requirements. (Audit form can be found at: www.cmu.edu/hub/forms)

Adding a Course

During the ADD period of each semester (the first two weeks of the semester), students may add a course by registering online. After the ADD deadline, they may add a course by completing the Late Add Request form and obtaining permission of both: 1) the instructor or teaching department and 2) their advisor.

(Add form can be found at: www.cmu.edu/hub/forms)

Dropping a Course

Students may withdraw from a course online. The university has a DROP deadline toward the end of the semester, after which the course appears on the student's transcript as withdrawn (W). The last day to withdraw from a class is the final day of classes. Complete the Retroactive Add/Drop form (found at www.cmu.edu/es/forms/), student will need to obtain permission of both: 1) the instructor or teaching department and 2) the advisor. Note that the Core courses and some Knowledge courses are only offered once per year so dropping a course may delay program completion.

Note: International students must maintain a minimum of 36 units (Full time) to meet the U.S. government's visa requirement. Please check with the Office of International Education (OIE) for more information.

Leave of Absence

Students who need to delay their studies for personal, medical or academic reasons may do so with a leave of absence (leaving the university temporarily with a commitment to return). Students must contact the MSBIC Director to discuss their plans and fill out the appropriate form. The student's place in the program will be held until a mutually determined time. For more information refer to

www.cmu.edu/policies/documents/StLeave.

When planning to return from Leave of Absence students must complete the appropriate paperwork before returning to the University.

Withdrawal

Students who need to withdraw from the program (leave the university with no intention of returning) for personal, medical or academic reasons must contact the MSBIC Director to discuss their plans and fill out the appropriate form. For more information refer to www.cmu.edu/policies/documents/StLeave.

TUITION AND FEES

Information about tuition and fees is available at www.cmu.edu/hub/tuition/index.

MSBIC students will pay tuition according to the rates set for the School of Computer Science. All tuition and fees must be paid in full by the due date; a student not in good financial standing will be dismissed from the program. Students taking summer courses must pay tuition.

GRADUATION CEREMONIES

The University holds one Commencement ceremony in May of each year.

There are no August or December commencement ceremonies. Students who graduate in December should stay in contact with the MSBIC Director and the Associate Dean for Graduate Education should they wish to participate in the May commencement ceremonies.

There are two May graduation ceremonies that pertain to MSBIC students: The University Commencement is typically held on the third Sunday in May, see the Academic Calendar at <http://www.cmu.edu/hub/calendar.html> for the date.

The LTI and LCCB Diploma Ceremony and Reception are usually held immediately after the university-wide Sunday Commencement. Students who graduated in December, as well as those receiving their degrees in May or the upcoming August, are eligible to participate in both the Diploma and Commencement Ceremonies.

Section 2. Resources

Academic Advising Orientation

There are two orientations for incoming graduate students. Both take place in the weeks preceding the Fall semester.

1. The university-wide orientation organized by the Offices of the Assistant Vice Provost for Graduate Education, Student Affairs and International Education introduces students to university resources and services. This occurs two weeks before the Fall semester begins.
2. The MSBIC orientation introduces students to departmental faculty, research, administration, policies and services. The LCCB arranges for students to receive the necessary information for enrollment, registration and timelines.

Student Rights in Academic Conflicts

A student wishing to appeal a program disciplinary decision should first speak with the faculty member directly involved. A student who is uncomfortable approaching the faculty member may discuss the matter with the Associate Dean for Graduate Education. (MSBIC students should contact Dr. Robert Frederking 412 268 6656 email: Ref+@cs.cmu.edu) If the conflict cannot be resolved on this level, the student is referred to the LTI or LCCB Department Heads, who may, with the student's permission, meet with both the student and the faculty member involved.

A student who is not satisfied with the resolution achieved through this internal departmental procedure may file a formal written appeal to both the Associate Dean for Graduate Education and the Dean of the School of Computer Science. The policies and procedures governing this process are explained in detail in the Summary of Graduate Student Appeal and Grievance Procedures which can be found at <http://www.cmu.edu/graduate/policies/>."

University Graduate Student Ombudsperson

Any grievance that cannot be resolved at the departmental level should be referred to the Assistant Vice Provost for Graduate Education, Dr. Suzanne Laurich-McIntyre

(suzannel@andrew.cmu.edu). The Ombudsperson is also available to students if they would like to consult with a resource outside the department prior to an issue becoming a grievance or during any part of a grievance process.

Training and Support Services

Graduate Student Support Services:

www.cmu.edu/graduate

There are a number of resources offered to graduate students through the office of the Assistant Vice Provost for Graduate Education. These include professional and personal development seminars, programs for underrepresented groups, the distribution of the GSA/Provost Conference and Small Research Grant Funds, and general resources for graduate students.

Graduate Student Assembly

www.cmu.edu/stugov/gsa/

The Graduate Student Assembly organizes campus wide activities and initiatives for graduate students funded through the student activities fees. A calendar of events and other resources are provided on their website.

Office of International Education (OIE)

www.cmu.edu/oie

The Office of International Education (OIE) provides critical services to international students, including advice on immigration, and on social and cultural issues. These services are explained during the Graduate Student Orientation in August before the fall semester begins.

Intercultural Communication Center (ICC)

www.cmu.edu/icc

The Intercultural Communication Center (ICC) offers non-native English speakers language support and cross-cultural training, as well as helping teaching assistants develop fluency.

Libraries

www.library.cmu.edu

There are three university libraries that provide research support for science students: the Sorells Library, the Hunt Library and the Mellon Library. First-year students receive a tour of the Mellon Library during orientation; one-on-one informational sessions can also be arranged.

Assistance for Individuals with Disabilities

www.cmu.edu/hr/eos/

Resources for individuals with disabilities are available through the Equal Opportunity Services Office.

Computing Services

Many general computer questions can be resolved quickly by contacting the Help Center (412-268-HELP [8-4357] or computing facility at: http://www.cs.cmu.edu/~help/about/about_us.html

Enrollment Services (the HUB)

www.cmu.edu/hub

The HUB provides a range of enrollment services. Information regarding the academic calendar, forms, official transcripts, schedule of classes, online registration, graduation procedures and other issues can be found on their Web site.

Honorary Societies

Graduate students are encouraged to belong to professional societies such as Phi Kappa Phi and Sigma Xi, and are nominated, if qualified, by the department. They are also urged to join the society's specific for their sub-discipline.

Compliance Issues

Intellectual Property

Students are required to comply with the University Policy on Intellectual Property (www.cmu.edu/policies/documents/IntellProp). This policy was developed to encourage and support the generation and dissemination of new knowledge by faculty, staff and students. It applies to patentable inventions, copyrightable material or trade secrets, works of art, and inventions and creations that might be considered proprietary.

Ethics

At all times, students are expected to conform to the highest ethical standards; consequences for academic or scientific misconduct are severe and may include dismissal from the program. The University Policy against Cheating and Plagiarism can be found at www.cmu.edu/policies/documents/Cheating.

Additional information regarding academic integrity can be found at http://www.cmu.edu/student-affairs/theword//acad_standards/integrity.html

Carnegie Mellon's Office of Research Integrity and Compliance is sponsoring a Responsible Conduct of Research (RCR) Seminar Series to provide participants with an introduction to topics typically included in RCR curriculum. Training in the Responsible Conduct of Research can also be accessed through on-line education via CITI. www.cmu.edu/osp/regulatory-compliance/research-ethics.html

While there is a university-wide disciplinary committee which handles serious disciplinary matters referred to it, the responsibility for establishing disciplinary guidelines also rests with each department. It is felt that the following set of rules can be uniformly and fairly applied in the MSBIC program.

Cheating in any form is not permitted as an ethical or professional behavior and will not be tolerated. Cheating includes, but is not necessarily limited to:

- The submission or use of falsified data.
- The submission of work that is not the student's own.
- Plagiarism- use or close imitation of the language and thoughts of another author and the representation of them as one's own original work.
- The use of an alternate/stand-in/proxy during an examination.
- Supplying unauthorized data to another student for the preparation of an assignment or during an examination.
- Collaboration in the preparation of an assignment, unless specifically required or allowed by the instructor, will usually be viewed as cheating. Each student, therefore, is

responsible for understanding the policies of the instructor offering any course as they refer to the amount of help and collaboration permitted in preparation of assignments.

Should any student be found guilty of cheating on a quiz, exam, homework or project, at minimum a zero grade will be recorded and then averaged in with the other grades (should there be any) for the term. Depending on the circumstances, and at the discretion of the instructor and the Department Head, the student may be failed in the course. Instructors may also recommend more severe penalties to the student's home department/program head which may include suspension or dismissal from the program. In any case, the University will be notified of any case of cheating or plagiarism. A repeated occurrence of cheating will be treated as an automatic failure in the course; the student will be dropped from the program.

A subtler form of cheating arises in the form of plagiarism, which is defined as "passing off as one's own the ideas or works of another." Making use of reference material and failing to note (either at all or properly) the original source constitutes plagiarism. When two or more people work together on an individual project and each then turns in his/her individual report as though no collaboration was involved, this also is plagiarism. Simply rewriting another's words or thoughts, or rearranging another's materials, is in every sense plagiarism - unless the student properly and completely references such material, each and every time it is used and to the full extent of usage.

Should a case of plagiarism arise, the initial responsibility for judging the seriousness of the offense will rest with the instructor. If the instructor feels that the student plagiarized flagrantly, and intentionally meant to mislead the instructor into thinking that the work was the student's own original work, the grade for the report, project will be recorded as zero and a report shall be filed with the department head and the office of the Dean of Students Affairs. It is up to the department head to impose additional penalties. Additional information can be found online at: <http://www.cmu.edu/policies/documents/GradDisc.html>

Students need to be aware that any group collaboration that involves individual take-home projects, papers or theses should be carried out only with considerable discretion. That is, students are encouraged to discuss and collaborate among themselves on the various principles which are explicated in class or covered in the reading material, etc.; but any group discussion or collaboration which involves any specifics of take-home projects, papers or theses should be avoided - unless the ideas or efforts of others are properly noted. Put differently, when individual work and thinking is called for, group thinking and/or work is entirely inappropriate and is a form of plagiarism.

Be aware that in addition to the information provided above each course instructor can set their own requirements regarding the amount of collaboration that is allowed and this may vary from college to college and within a department. Thus it is important to consult with the faculty teaching the course if you have any questions about the level of group work and/or collaboration allowed in the course.

In any case of cheating or plagiarism, the student may request a review of the instructor's decision by the department head, who will then make the final decision for the department. The

student, of course, can appeal following the process as outlined in the Academic Disciplinary Actions Overview for Graduate Students.

<http://www.cmu.edu/policies/documents/Cheating.html>

Section 3. Financial Issues

Graduate Student Funding

Guidance on financial aid and graduate student loans can be found at www.cmu.edu/finaid/docs/grad-guide.pdg. Additional information on financial issues for graduate students can be found at <http://www.cmu.edu/hub/new-grad/>

Health Insurance

Carnegie Mellon has a Student Health Insurance policy requiring full-time, degree seeking students to carry adequate medical insurance. Students will either be required to purchase the plan offered by the University or an application for a waiver can be made if the student is “enrolled as the dependent, partner/spouse or principal in an employer or government-sponsored insurance plan” (see the Carnegie Mellon University Student Health Insurance Policy at <http://www.cmu.edu/policies/documents/StudentInsurance>).

The university offers two levels of health plans. It is the responsibility of each student to make arrangements with Student Health Services to either pay for their insurance at the beginning of the semester, or elect a payment plan over the course of the academic year. More information is available at the Student Health Services Web site www.studentaffairs.cmu.edu/HealthServices/insurance or by emailing shinsure@andrew.cmu.edu.

Student Health Services

The Student Health Services Center provides general and some specialized medical care at a discount or free of charge to all full-time Carnegie Mellon students. There are fees for laboratory tests and prescription drugs at the on-site pharmacy.

Information can be found at www.studentaffairs.cmu.edu/HealthServices.

Emergency Loans

All students regardless of their program are eligible for the Emergency Student Loan, which is an interest-free and emergency based loan repayable within 30 days. It is available through the Office of the Dean of Student Affairs; students may apply for the loan by stopping in to the Student Affairs Office, Warner Hall 301, or by calling (412) 268-2075 for an appointment.

Housing

Carnegie Mellon does not provide housing for graduate students. The University's Community Housing Office (www.cmu.edu/housing/community-housing/) keeps updated lists of apartment rentals, and other pertinent information. The office also offers limited transitional housing for students while searching for an apartment before the beginning of the academic year.

Section 4: Forms

Enrollment Services Forms (the Hub; www.cmu.edu/hub)

Pass/Fail Approval

Course Audit Approval

Late Add Request (current semester only)

Leave of Absence

Return from Leave of Absence

Withdrawal (from Carnegie Mellon)

Enrollment Verifications (available from Student Information Online, under “Request Documents.”)

Last updated: 07/13/2012