

Library Resource Form Required for New Courses

Submission Deadlines: Fall - October 11, 2005 Spring - February 14, 2006

TITLE Biology 2: Concepts in Genetics

Sponsor(s) Cristina Iftode e-mail: iftode@rowan.edu

DEPARTMENT Biological Sciences
College LAS

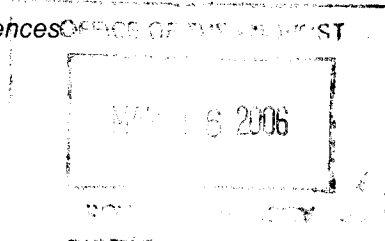
If LAS-check: History/Humanities Social/Beh Sciences

Math/Sci

UNDERGRADUATE

- Minor changes to existing
- Request new or existing
- Writing Intensive
- Multicultural-Global
- Changes to General Education components of a degree or program
- New or Existing course to be placed in the General Education Bank:
- Fine/Performing Arts LAS: Humanities
- LAS: Social Behavior LAS: Math/Science
- Communication Studies

Description:



*iftode
hecht
demeter*

*DF
5/22/06*

Signatures Required: representing approval before submission to Office of the Senate

Department Chair: _____ Date: 10/7/05
 Department CURRICULUM Chair: _____ Date: 10/7/05
 Academic DEAN: _____ Date: 10-11-05

COLLEGE CURRICULUM COMMITTEE: Open Hearing Date: 18 Nov 2005
 Approved _____
 Not Approved _____

Signature: College Curriculum Chair _____

Signature: SENATE CURRICULUM CHAIR _____
Date: _____

Comments: _____

Signature: Executive Vice President/Provost: _____
Date: _____

Signature: REGISTRAR _____
Date: 3/31/06

Course Description Received & Approved
Hegis Taxonomy & Course

BIOL 01.106

Notification Forward:

<input checked="" type="checkbox"/>	SCC CHAIR	<input checked="" type="checkbox"/>	Academic Dean
<input checked="" type="checkbox"/>	IR	<input checked="" type="checkbox"/>	Department Chair
<input checked="" type="checkbox"/>	CAP	<input checked="" type="checkbox"/>	VP/Student Affairs
<input checked="" type="checkbox"/>	Registrar	<input checked="" type="checkbox"/>	Other-

This form **MUST BE COMPLETED FOR NEW COURSE or PROGRAM PROPOSALS, and EXTENSIVE HANGES TO A COURSE or PROGRAM.**

The purpose of this form is to provide a channel of communication between the Campbell Librarians and faculty when submitting new course or program proposals, or making extensive changes to existing courses or programs. The information will be used to assess the resources available in the library, and to identify resources the library should acquire to support the new courses/programs, or extensive changes to same. The information will also provide the rationale for institutional support for library acquisitions. This form should be completed in a coordinated effort between the course sponsor(s) and the academic department liaison librarian.

Note: Sponsor(s) complete parts A & B
If assistance is required to complete, please notify the librarian liaison.
Forward this form to the librarian who will complete parts C, D & E

When form is completed, attach to the original curriculum proposal before submitting to the Senate office.

A. College: LAS

Department: Biological Sciences

Proposed by: Cristina Iftode

Date: 10/7/2005

COURSE TITLE: Biology 2: Concepts in Genetics

Anticipated Date for Course/Program Offering: Fall 2006

B. List specific resources that should be acquired to support this course.

We anticipate that current library resources are sufficient for this course.

C. Describe the resources available in the library to support this course/program, including reference, monographic, electronic databases, audio-visual materials, etc. A summary statement is sufficient.

We have 100 books in the library under the subject heading Genetics. Databases supporting this area include Science Direct, Medline, Nature, Annual Reviews, and Biological and Agricultural Index.

D. List key periodicals available in the library to support this course/program.

We don't have any print journals specifically targeted to genetics, but department faculty members seem to feel that our access to electronic journals provides sufficient coverage.

E. Librarian comments & recommendations:

The library can support the new course with our current resources. We would be happy to consider adding a print subscription to a genetics-related journal if the department has one they would like to get.

LIBRARIAN LIAISON: Denise Brush

Signature: Denise A. Brush

Rowan University
Department of Biological Sciences
New Course Proposal

Details

- a. Course Title:** Biology 2: Concepts in Genetics (0401.104)
- b. Sponsor:** Cristina Iftode, Assistant Professor
Department of Biological Sciences
- c. Credit Hours:** 4 s.h.
- d. Course Level:** Undergraduate (100-level). This course will be offered as a General Education course in the Science and Mathematics bank.
- e. Prerequisites:** Biology 1 (0401.103)
- f. Implementation:** The proposed course is required for all biology majors and minors. It will be offered for the first time in spring 2007 and every spring semester thereafter.

Curricular Effects

Biology 2 (0401.104) is a new offering in the Department of Biological Sciences and will be required for all biology majors and minors. We also anticipate that this course will be required as part of the Biochemistry major in the Department of Chemistry and Biochemistry.

This course will fulfill in part (for non-Biology majors) the Science and Mathematics bank of the University's General Education requirements. We expect that it will be utilized particularly by students in the Department of Computer Science for whom a two-semester laboratory science sequence is required. There should be no other impact on departments of the College of Liberal Arts and Sciences or the University as a whole.

As the second course in a sequence of four that constitute the proposed Biology Core Curriculum, Biology 2 (0401.104) will reinforce skills that the students learned in Biology 1 (0401.103), while allowing them to acquire new knowledge and abilities. Biology 2 is a laboratory course that emphasizes basic concepts in classical, molecular and population genetics.

The sponsor, Dr. Cristina Iftode, is a molecular biologist with expertise in eukaryotic molecular genetics. She has been at Rowan for four years during which she taught introductory biology, introductory and advanced genetics, and senior seminars on gene therapy and molecular mechanisms of genetic diseases. In her courses, she has worked to incorporate case discussion and presentation by

the students of topics from scientific magazines and top scientific journals. Dr. Iftode is also a member of the American Society for Microbiology and the American Society for Virology. In addition to the course sponsor, the Biological Sciences Department has other members well-qualified to teach this course including Dr. Hecht, Dr. Scott and Dr. Krufka.

The current resources of the Biological Sciences department are inadequate for the proposed course. The new core sequence will emphasize both knowledge content and skill development. Acquiring skills in current techniques in genetics will be an integral part of the laboratory component of this course. To successfully integrate contemporary techniques in this course, we must modernize the equipment available to teach the laboratory. Without this equipment, our ability to offer the students the best educational experience and exposure to marketable skills will be compromised. The equipment required is listed in Appendix A. Library resources are adequate to meet the present needs of this course.

Rationale

Biology 2 (0401.104) will be part of the new sequence of introductory courses that form the proposed Biology Core Curriculum. Like the other courses of the new core, Biology 2 will increase the early development of skills that students will use throughout their academic careers and beyond. The course will build upon knowledge from Biology 1 and will provide content that will be the basis for the other two courses of the core as well as upper level courses. The abilities and knowledge gained in this course will help our majors understand the active nature of scientific investigation.

Essence of the Course

a. Objectives of the Course: The course is designed to introduce students to basic concepts of genetics that apply to both prokaryotic and eukaryotic systems. The information is covered in the following logical and accessible progression: (a) Classical genetics; (b) Molecular genetics; (c) Population, quantitative and evolutionary genetics.

Biology 2 (0401.104) is organized to emphasize an experimental, inquiry-based strategy, moving farther away from a content-intensive, faculty-centered approach to deliver information. Each lecture will be an active learning environment, where students will do problem-solving activities and work in groups on applying genetics knowledge they gained by reading the assigned materials before coming to class. Short presentations by the students will outline their approach and conclusions, and will be open for further discussion.

The focus of this course is on understanding the principles of genetics and developing the ability to critically evaluate data, rather than just memorizing

facts. To engage and motivate students, the course will discuss the landmark research experiments that have contributed to our current knowledge of genetics. In addition, case studies that address the implications and applications of genetics will be used as instructional tools.

Student Outcome Objectives:

- Address genetics as the science that provides one of biology's unifying principles: all organisms use the same genetic system
- Understand genetics as the science at the foundation of a multitude of biological disciplines
- Explore the experimental approaches and systems used in the study of genetics and apply this knowledge to experimental design in general (learn how to keep a laboratory notebook)
- Develop skills for reading and understanding articles from scientific magazines
- Develop presentation skills of popular scientific topics
- Strengthen scientific writing abilities (bibliographies)

b. Topical Outline/Content

The topics to be covered are listed below. The instructor will supply the students with a syllabus during the first week of classes. The instructor will assess any technology advances in the subject matter prior to the course and make topic changes as deemed appropriate to maintain the level and currency of instruction.

Lecture content

a) CLASSICAL GENETICS

Introduction to genetics

Relation of genetics to other biological disciplines, Historical perspectives, Model systems, Experimental approaches

Chemistry of life

Atoms, Molecules, Water and its properties, Chemistry of carbon, Structure and function of nucleic acids and proteins

Chromosome and cellular reproduction

Outline of the cell cycle, Mitosis, Meiosis

Mendelian inheritance

Mendel's laws, Mono- and di-hybrid crosses, Predicting the outcome of genetic crosses using probabilities and statistics

Extensions of mendelian genetics

Partial and incomplete dominance, Penetrance and expressivity, Lethal and multiple alleles

Sex-linked inheritance

Sex determination, X-chromosome inactivation/dosage compensation, Sex-linked traits

The study of human genetic traits

Pedigree analysis, Genetic testing, Genetic counseling

Chromosome variation

Chromosome rearrangements, Aneuploidy, Polyploidy

Microbial genetics

Genetics of bacteria and viruses

b) MOLECULAR GENETICS

Structure of the genetic material

Review of nucleic acid structures, Chromosome structure, Transposable elements

From nucleic acids to proteins

DNA replication, Transcription, RNA processing, Translation, The genetic code

Genetic variability

DNA recombination, Mutations, DNA repair

DNA technology and genomics

Gene cloning, Genes and genomes analysis, Applications of recombinant DNA technology

c) QUANTITATIVE, POPULATION AND EVOLUTIONARY GENETICS

Quantitative genetics

Polygenic inheritance, Heritability, Response to selection

Population genetics

Genotypic and allelic frequencies, The Hardy-Weinberg law and assumptions

Evolutionary genetics

Molecular evolution: Protein variation, DNA sequence variation, Genome evolution

Laboratory content

The laboratory component of the course is designed as one project that spans over several lab periods, and a few one-lab time experiments. The main project evolves around a single organism, *Drosophila melanogaster*. The project is set up to walk the students from the basic mechanisms of transmission genetics to the molecular organization of the genetic material and then to population dynamics. The students will become familiar with this organism's life cycle, they will learn to maintain and manipulate the fruit flies, make genetic crosses, extract chromosomes and chromosomal DNA, collect, analyze and interpret data. The small laboratory exercises are designed to study the stages of the cell cycle, the processes of replication, transcription and translation, analyze different types of mutations and learn basic DNA manipulation techniques. Organisms such as bacteria and yeast will be utilized in these mini-projects. To aid in the illustration of some genetic concepts, "virtual labs" will be also used. These are computer based-exercises specifically designed to exemplify processes that are more difficult to analyze experimentally by first year undergraduate students.

c. Evaluation of Students and Grading

Students will be evaluated on quizzes, homework, written exams, short written summaries and oral presentations of various genetics topics, and class participation. In addition, students will be evaluated throughout their laboratory projects by their research goal description, experimental design, and written report of the results obtained and their interpretation.

d. Course Evaluation

The course will be evaluated by four means:

1. Evaluation of students. Student learning will be accessed by the methods indicated above in part c. and by various classroom assessment techniques used throughout the semester.
2. Student evaluation: Student evaluation of the course and instructor will be administered at the end of the semester.
3. Peer evaluation: A colleague in the Department of Biological Sciences will observe the instructor in the classroom and evaluate the instructor performance at the end of each semester.
4. Department course evaluation: The Biological Sciences Department evaluates all courses to ensure that they meet the requirements of the Department, the College of Liberal Arts and Sciences, and the University. The assessment of these new core courses will be particularly rigorous and will follow procedures outlined in the proposal detailing the overall changes to the Biology major.

Results of Consultations

The members of the Biological Sciences Department have been solicited for comments on the course proposal, and they have confirmed that this course would meet the standards of their department. A letter of consultation from the department chair is attached.

Consultation letters indicating support for this course are also attached from the Departments of:

- Chemistry and Biochemistry
- Physics and Astronomy
- Computer Science
- Psychology
- Chemical Engineering
- Mechanical Engineering
- Secondary Education
- Philosophy and Religion

Catalog Description

Biology 2: Concepts in genetics (0401.104)

4 semester hours

Prerequisites: Biology 1 (0401.103)

The course is designed for first year biology majors and builds on skills and knowledge gained by the students from Biology 1. The course focuses on the study of genetic factors in bacteria, viruses, higher plants and animals. The principles of mendelian, molecular and population genetics will be introduced. Discussion of genetic applications in agriculture, biotechnology and medicine will be an integral part of the course. The laboratory projects will provide the students with the opportunity to gain hands-on experience with the most common classical and molecular genetics methods. Credit will not be given for both Biology 2 (0401.104) and Biology II (0401.101).

Appendix A – Specialized equipment required to equip Biology 2 and 3 teaching laboratories

ITEM	Quantity
Microbial incubators/shakers (liquid cultures)	1
Microbial incubators (plates)	2
Water baths	2
Nucleic acid electrophoresis apparatus	10
Protein electrophoresis apparatus	10
Electrophoresis power supplies	4
Microfuges (+ rotors)	4
Heat blocks	2
Rotators (Nutator)	2
Transfer apparatus	2
Microwaves	3
Pipettmen - set of 3 volume ranges	2
Mettler balance (>1 g range)	1
Mettler balance (< 1 g range)	1
Harvard trip balances	2
pH meters	4
PipetAid	4
microscope for cell cultures	1
rotor for cell culture centrifuge	1

The Chemical Engineering program has reviewed your curriculum proposal and we are supportive of the proposed changes to the Biological Science Curriculum.

=====

Robert P. Hesketh
Professor and Chair
Chemical Engineering
Rowan University
201 Mullica Hill Rd.
Glassboro, NJ 08028-1701

Phone: (856) 256-5313
Fax: (856) 256-5242
email: hesketh@rowan.edu
<http://users.rowan.edu/~hesketh>



Memorandum

Mechanical Engineering

To: Dr. Michael Grove, Department of Biological Sciences

From: John Chen, Associate Professor and Chairperson

Date: 5 October 2005

A handwritten signature in black ink, appearing to read "John C. Chen".

Re: Letter of consultation for proposed revision of the introductory biology curriculum

This letter is in support of the proposal entitled, "Revision of the Introductory Biology Curriculum and Biology Major," prepared and sponsored by the Department of Biological Sciences. My program supports the proposed revision and the new structure of the introductory biology sequence. These changes will not adversely affect Mechanical Engineering students.

Please contact me if there are further questions or concerns. Thank you.

Michael,

The Computer Science Department supports your proposed changes in the Biology sequence. Since our majors are required to take 3 semesters of lab science, and they often opt for Biology I and II, we are pleased to note the emphasis on Genetics and Evolution. This will help prepare our students for further study in Bio-informatics in graduate school.

Seth D. Bergmann	Interim Department Chair
Computer Science	bergmann@rowan.edu
Rowan University	856-256-4500 ext. 3197
Glassboro, NJ 08028	Fax: 856-256-4741
USA	cs.rowan.edu/~bergmann

The Department of Chemistry and Biochemistry fully supports the efforts of your department to reinvent your core courses. It is admirable that you engage in this level of effort to recreate the beginnings of your field and especially to include the broader concepts of science. We are very interested in your inclusion of active teaching methods and will watch this change carefully. We are also intrigued by the lab changes you propose that will result in the adoption of more inquiry based experiences.

We appreciate the many discussions we have had to fine tune the curriculum our biochemistry majors should follow under this new scheme.

Robert Newland, Ph.D.
Chair, Chemistry & Biochemistry
Rowan University
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FAX (856) 256-4478
newland@rowan.edu



Department of Physics and Astronomy

Date: October 10, 2005
To: Dr. Michael Grove
From: Jeff Hettinger, Chair, Department of Physics
and Astronomy
Re: Curriculum Proposal

This memo provides the support of the Department of Physics and Astronomy for the reconfiguration of the introductory courses in the Biology program. We feel that this is an excellent idea/plan.

Students in our Physical Science program who are currently required to take either Biology I or II can be accommodated by your new Biology I course since it will remain in the Math/Science General Education Bank and the content description seems practical for this group.

These modifications may impact decisions our department makes in the future. Our department has been considering the possibility of enhancing our Physics program to include some Biophysics content in the form of a concentration or minor. Your response to Dr. Newland with regard to his Biochemistry program suggesting that it would be possible to take Biology II and III as well as upper level courses in Biology if the skills developed in Biology I and IV were accounted for in other courses ensures us that we can work out a solution to this issue when it arises.

To: Mike Grove, Biological Sciences
From: Keiko Stoeckig, chairperson, Psychology Department
Date: October 6, 2005
RE: proposed changes to current Introductory Biology curriculum and Biology major

The Psychology Department has reviewed the proposed revisions to the Biology major and the Introductory Biology courses, and we would like to commend Mike Grove and the Biology Department for crafting such a thoughtful proposal. The overall revision to the Biology major, of course, is best evaluated by the Biology Department, and it will have little immediate effect for the Psychology Department. However, the restructuring of the Introductory Biology courses could have a substantial impact on the General Education courses required for Psychology majors.

Currently, Psychology majors are required to complete one of the following to fulfill the lab science General Education requirement: General Biology: Human Focus, Biology I, Biology II, or Anatomy & Physiology I. The Psychology Department has no objection to the restructuring of content as proposed for the new Biology 1 and Biology 2 courses, so long as these courses will be offered as General Education courses (as has been indicated in the course proposals). In fact, the content described in the proposed Biology 1 course appears to better fit the needs for a Psychology major than the content of the current Biology I course. (However, General Biology: Human Focus remains the course that best meets our needs, and thus will remain the recommended course for Psychology majors.)

There is some concern that the content of the proposed Biology 2 course might be too narrowly focused to satisfy the needs of our majors, so it might be the case that the Psychology Department would not permit Biology 2 to be used to fulfill the Biology lab science requirement. This could become problematic for transfer students, if the General Biology course taken at a community college were to be accepted as equivalent to the proposed Biology 2 course rather than the proposed Biology 1 course. However, in the event that this should happen, the Psychology Department might be willing to allow transfer student to complete another Biology course (such as Human Biology) to fulfill our Biology requirement. Nevertheless, attention to the transfer equivalence of the proposed Biology 1 and Biology 2 courses would be an important consideration for the Psychology Department.

Although, as stated earlier, the revision of the Biology major has little immediate impact on the Psychology Department, this revision might have a longer-term effect on the structure of a future neuroscience major (a joint program, in the early stages of development, to be proposed by the Psychology and Biology Departments). The increased flexibility afforded by the proposed changes to the Biology major would appear to allow for an easier integration of Biology courses into the neuroscience program, so from that standpoint, as well, the Psychology Department is supportive of the proposed revisions.

In summary, the Psychology Department offers its full support for this proposal. Although it is possible that, as a result of this revision, some initial minor difficulties might occur, the Psychology Department is certain that any such issues can be resolved. Thus, we believe that this well-conceived program proposal deserves the University's full support.

Thank you for the opportunity to review your program proposal. If you require additional information, please feel free to contact me at x4821 or stoeckig@rowan.edu.

Keiko Stoeckig

October 3, 2005

Dr. Michael Grove
Department of Biology
Dear Mike,

Thanks for sending me the copy of the biology department's proposed revision of its core curriculum and general education requirements. This looks like a well considered and quite exciting change, which promises to provide an even better biology training than the already very good one that Rowan's bio majors receive.

Our department has discussed your proposal to require Philosophy of Science of all your majors, and we are unanimous in supporting it. We deeply appreciate the interdisciplinary relationships our department has with so many others on campus, not least with the sciences, all of which will now require their students to take this course. We believe (as you obviously do) that taking the course will make your majors more thoughtful and theoretically alert scientists. The benefits are mutual; Matt Lund, who teaches the course, is excited about the prospect of having more scientists in his class, and when our major is finally approved and comes on line, our students will benefit by taking it with science majors.

There is no avoiding the fact that this requirement will have significant staffing implications for our department. You graduate between 70 and 80 majors each year, and that number is rising. Philosophy of Science, a writing intensive course, is capped at 25. That means we must add at least three new sections a year, more likely four, in order to meet the needs of your department. Chemistry and Biochemistry has just added Philosophy of Science to their requirements; and while Physics already requires it, they have begun allowing substitutions because the class is in such high demand. The unmet demand from these two majors will mean at least one additional section of the course.

So we must also ask for your support. Please join with your colleagues in the other sciences to tell the Dean and the Provost that the Biology department and the other sciences need two-thirds of a new line *in Philosophy and Religion* in order to implement your new core curriculum. We will ask for a full line for this purpose, and use the remaining third to reduce our dependence on adjuncts or to diversify our offerings in the philosophy of the sciences and technology.

Sincerely,

David Clowney
Chair, Department of Philosophy and Religion



November 7, 2005

Dr. Michael Grove
Biology Department
Science Hall
Rowan University
Glassboro, NJ 08028

Dear Mike,

Thank you for the opportunity to review the proposed changes in the biology core curriculum and the five proposed courses required to implement the curriculum. I apologize for this very tardy letter of consultation.

The Secondary Education/Foundations of Education departmental curriculum committee has reviewed the proposals and supports them. We do not believe they will affect adversely our students, though we will need to be careful in scheduling our science methods courses. As we are consulting with the academic content major departments as we start scheduling our new courses, we do not view this as a difficult or onerous task. We are pleased to note the particular care you took to accommodate transfer students.

Personally, I think the proposals are a creative way of meeting changing perspectives in educating the next generation of biologists. My compliments to the committee.

Cordially,

Holly G. Willett
Associate Professor
Chair, SE/FE

To Whom It May Concern:

This email is intended to confirm not just my endorsement of the five new Biology Core courses and additional changes to the major, but also an endorsement from the Department as a whole. The entire Department has been consulted at every step in the development of these curricular proposals, and it has always met with unanimous support.

These changes will bring our Department to a level similar to comparable institutions. The emphasis in the new Core will be not just on knowledge content, but also on the skill content. We anticipate that the Core revisions will have a profound impact on the sophistication of our upper-level courses and on the marketable skills of our graduates. The commitment of our faculty to these changes is illustrated by their attendance at weekly core curriculum development meetings. The additional changes to our degree requirements directly address Department objectives and will enrich the qualifications and skill sets of our majors.

These new courses and the overall curricular changes have my strong, enthusiastic support, and I am happy to confirm that the Department is eager to implement them.

Sincerely,

Gregory B. Hecht, Ph.D.
Interim Chairperson
Associate Professor of Microbiology
& Molecular Biology
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<http://www.rowan.edu/biology>

Mike,

I have been reviewing the proposals for the biology core revision.

I'm impressed with the careful rethinking of your entire program that the department has undertaken. In COE we know a good deal about the work involved in a major restructuring of a curriculum! The active learning assignments and activities, the engagement with the professional literature, the deep holistic understanding of the field that you're striving for—these are elements that will strengthen student engagement with biology.

While our department curriculum committee hasn't had an opportunity to look at all the proposals in the detail they merit, I am venturing to suggest a couple of relatively small changes

1. The Course Evaluation section of the Biology 1 proposal needs more specific methods. Perhaps you should refer to the core curriculum proposal where these methods are described.
2. I note with approval that you're requiring Bio 1 students to use primary literature. However, you say that library resources are adequate. Are you sure about that? Will students have access to the databases and research articles they will need? I know that you're asking for a chunk of money to supply the laboratories needed for the new courses and you probably want to avoid asking for library resources in addition. However, you do need to have Greg Potter complete the library resources form for each of these course proposals and the core curriculum proposal. You're expected to at least list the resources available to you currently.

Initially, it appears that K-12 Subject Matter Teaching students will not be affected negatively by the change as the total number of credit hours will not change. The sequencing of the courses may need to be carefully worked out in future years for those students who are dual majors with K-12 Subject Matter-Biology. The special course to integrate transfer students is an excellent idea, and perhaps a model that other departments should emulate.

The inquiry-based methods you're proposing for your new curriculum might dovetail well with the Inquiry and Discovery course that elementary education majors are required to take in the new program. Just a thought!

After our SE/FE curriculum committee reviews your proposals, I will write a more formal letter. However, I believe that you can use this e-mail as evidence that you have consulted with us.

By the way, was your NSF CCLI proposal funded?

Holly Willett
Chair
SE/FE