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FORMAT 1

Submit original with signatures + 1 copy + electronic copy to UAF Governance.

See http://www.uaf.edu/uafgov/faculty/cd for a complete description of the rules governing curriculum & course changes.

TRIAL COURSE OR NEW COURSE PROPOSAL

SUBMITTED BY:

Department	**Chemistry and Biochemistry**	**College/School**	**CNSM**
Prepared by	**William Simpson**	**Phone**	**474-7235**
Email Contact	**wrsimpson@alaska.edu**	**Faculty Contact**	**Kelly Drew <kdrew@alaska.edu>**

1. ACTION DESIRED (CHECK ONE): Trial Course [ ] New Course [NEW]

2. COURSE IDENTIFICATION: Dept [CHEM] Course # [F671] No. of Credits [3]

Justify upper/lower division status & number of credits: **Course will consist of 3h or lecture/week. Students will be asked to apply concepts introduced in upper division biochemistry courses to derive and apply theoretical models used in receptor pharmacology.**

3. PROPOSED COURSE TITLE: **Receptor Pharmacology**

4. To be CROSS LISTED? *YES/NO* [No] If yes, Dept: [ ] Course # [ ]

(Requires approval of both departments and deans involved. Add lines at end of form for such signatures.)

5. To be STACKED? *YES/NO* [No] If yes, Dept. [ ] Course # [ ]

6. FREQUENCY OF OFFERING: **Spring Odd-numbered Years**

Fall, Spring, Summer (Every, or Even-numbered Years, or Odd-numbered Years) — or As Demand Warrants

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Dean's Office
College of Natural Science & Mathematics

7. SEMESTER & YEAR OF FIRST OFFERING (if approved) **Spring 2015**

8. COURSE FORMAT:

NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than six weeks must be approved by the college or school's curriculum council. Furthermore, any core course compressed to less than six weeks must be approved by the core review committee.

COURSE FORMAT: (check all that apply)	[ ] *1*	[ ] *2*	[ ] *3*	[ ] *4*	[ ] *5*	[XX] *6 weeks to full semester*
OTHER FORMAT (specify)						
Mode of delivery (specify lecture, field trips, labs, etc)	**Lecture**					

9. CONTACT HOURS PER WEEK: [3] LECTURE hours/weeks [0] LAB hours /week [0] PRACTICUM hours /week

Note: # of credits are based on contact hours. 800 minutes of lecture=1 credit. 2400 minutes of lab in a science course=1 credit. 1600 minutes in non-science lab=1 credit. 2400-4800 minutes of practicum=1 credit. 2400-8000 minutes of internship=1 credit. This must match with the syllabus. See http://www.uaf.edu/uafgov/faculty/cd/credits.html for more information on number of credits.

OTHER HOURS (specify type) [ ]

10. COMPLETE CATALOG DESCRIPTION including dept., number, title and credits (50 words or less, if possible):

CHEM F671 Receptor Pharmacology
Offered Spring Odd-numbered Years
3 credits

Covers basic drug/receptor theory to train students to a) assess affinity and efficacy of receptor ligands b) work with and interpret functional assays and binding results c) critically evaluate original research regarding receptor pharmacology with an emphasis on ligand-gated ion channels and G-protein coupled receptors and c) identify testable hypotheses and design experiments to test these hypotheses. Prerequisites: Upper division or graduate biochemistry or neurochemistry course or permission of instructor. BIO 417 Neurobiology is recommended. (3+0)

Governance 9/27/12

11. *COURSE CLASSIFICATIONS:* (undergraduate courses only. Use approved criteria found on Page 10 & 17 of the manual. If justification is needed, attach on separate sheet.)

H = Humanities [ ] S = Social Sciences [ ]

Will this course be used to fulfill a requirement for the baccalaureate core?	YES [ ]	NO [No]

IF YES, check which core requirements it could be used to fulfill:

O = Oral Intensive, Format 6 [ ] W = Writing Intensive, Format 7 [ ] Natural Science, Format 8 [ ]

12. *COURSE REPEATABILITY:*

Is this course repeatable for credit?	YES [ ]	NO [No]
Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time).	N/A	
How many times may the course be repeated for credit?	1	TIMES
If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course?	3	CREDITS

13. *GRADING SYSTEM:* ***Specify only one.***

LETTER: [XX] PASS/FAIL: [ ]

RESTRICTIONS ON ENROLLMENT (if any)

14. *PREREQUISITES*	Upper division or graduate biochemistry or neurochemistry course or permission of instructor. BIO 417 Neurobiology is recommended

These will be *required* before the student is allowed to enroll in the course.

15. *SPECIAL RESTRICTIONS, CONDITIONS*	N/A
16. *PROPOSED COURSE FEES*	$ 0
Has a memo been submitted through your dean to the Provost & VCAS for fee approval? **Yes/No**	N/A

17. *PREVIOUS HISTORY*

Has the course been offered as special topics or trial course previously? **Yes/No**	Yes
If yes, give semester, year, course #, etc.:	Chem F693 Receptor Pharmacology, Spring 2011

18. *ESTIMATED IMPACT*

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

The need for this course was identified by the graduate faculty of the Biochemistry and Molecular Biology Program, and thus it was offered as a special topics in Spring 2011. We are now applying to make this an alternate-year graduate course.

19. *LIBRARY COLLECTIONS*

Have you contacted the library collection development officer (kljensen@alaska.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

No	[ ]	Yes	[x]	**Contacted 9-18-2012. Original articles available online or via e-mail requests will suffice. Karen said, "we intend to maintain our Elsevier Science Direct subscriptions for the foreseeable future".**

20. *IMPACTS ON PROGRAMS/DEPTS*

What programs/departments will be affected by this proposed action?

Include information on the Programs/Departments contacted (e.g., email, memo)

Students from Biology and Wildlife could take this course to enhance their knowledge, so there is positive impact there. We will advertise the course so as to get as many students as possible.

21. *POSITIVE AND NEGATIVE IMPACTS*

*Please specify **positive and negative** impacts on other courses, programs and departments resulting from the proposed action.*

Positive: Graduate students need training in Receptor Pharmacology, particularly for students interested in Biomedical Area and/or Pharmacology. Therefore, the Biochemistry and Molecular Biology Program will be strengthened.

Negative: The offering of this course will restrict what other graduate courses we can offer; however, the need for teaching it outweighs the negative impact on other courses.

JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. Use as much space as needed to fully justify the proposed course.

Receptor pharmacology is a high demand area for students trained in biochemistry and is fundamental to all of the neuroscience research at UAF and in particular research within the biochemistry and molecular biology program. Student and faculty demand for this course suggested that it should be offered in place of topics in neurochemistry.

APPROVALS:

(Collin Simpson) Date 20 Sep 2012
Signature, Chair, Program/Department of: Chemistry and Biochemistry

Date 9/26/2012
Signature, Chair, College/School Curriculum Council for: CNSM

Date 9/26/12
Signature, Dean, College/School of: CNSM

Date
Signature of Provost (if applicable)
Offerings above the level of approved programs must be approved in advance by the Provost.

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

Date
Signature, Chair, UAF Faculty Senate Curriculum Review Committee

ADDITIONAL SIGNATURES: (As needed for cross-listing and/or stacking)

Date
Signature, Chair, Program/Department of:

Date
Signature, Chair, College/School Curriculum Council for:

Date
Signature, Dean, College/School of:

ATTACH COMPLETE SYLLABUS (as part of this application).

Note: The guidelines are online: http://www.uaf.edu/uafgov/faculty/cd/syllabus.html

The department and campus wide curriculum committees will review the syllabus to ensure that each of the items listed below are included. If items are missing or unclear, the proposed course change will be denied.

SYLLABUS CHECKLIST FOR ALL UAF COURSES

During the first week of class, instructors will distribute a course syllabus. Although modifications may be made throughout the semester, this document will contain the following information (as applicable to the discipline):

1. **Course information:**
   ❑Title, ❑ number, ❑credits, ❑prerequisites, ❑ location, ❑ meeting time
   (make sure that contact hours are in line with credits).
2. **Instructor (and if applicable, Teaching Assistant) information:**
   ❑ Name, ❑ office location, ❑ office hours, ❑ telephone, ❑ email address.
3. **Course readings/materials:**
   ❑ Course textbook title, ❑ author, ❑ edition/publisher.
   ❑ Supplementary readings (indicate whether ❑ required or ❑ recommended) and
   ❑ any supplies required.
4. **Course description:**
   ❑ Content of the course and how it fits into the broader curriculum;
   ❑ Expected proficiencies required to undertake the course, if applicable.
   ❑ Inclusion of catalog description is *strongly* recommended, and
   ❑ Description in syllabus must be consistent with catalog course description.
5. ❑ **Course Goals (general), and (see #6)**
6. ❑ **Student Learning Outcomes (more specific)**
7. **Instructional methods:**
   ❑ Describe the teaching techniques (eg: lecture, case study, small group discussion, private instruction, studio instruction, values clarification, games, journal writing, use of Blackboard, audio/video conferencing, etc.).
8. **Course calendar:**
   ❑ A schedule of class topics and assignments must be included. Be specific so that it is clear that the instructor has thought this through and will not be making it up on the fly (e.g. it is not adequate to say "lab". Instead, give each lab a title that describes its content). You may call the outline Tentative or Work in Progress to allow for modifications during the semester.
9. **Course policies:**
   ❑ Specify course rules, including your policies on attendance, tardiness, class participation, make-up exams, and plagiarism/academic integrity.
10. **Evaluation:**
    ❑ Specify how students will be evaluated, ❑ what factors will be included, ❑ their relative value, and
    ❑ how they will be tabulated into grades (on a curve, absolute scores, etc.)
11. **Support Services:**
    ❑ Describe the student support services such as tutoring (local and/or regional) appropriate for the course.
12. **Disabilities Services:**
    The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials.
    ❑ State that you will work with the Office of Disabilities Services (208 WHIT, 474-5655) to provide reasonable accommodation to students with disabilities."

Chemistry 671: Receptor Pharmacology

Instructor:	Dr. Kelly Drew
Office/office hrs:	Irving I, room 104A 10:00am-4:00pm, stop by or call for an appointment
Telephone:	474 – 7190
e-mail:	kdrew@alaska.edu
Lecture:	Time: Tuesday and Thursday 3:40-5:10 Location: TBA
Homework:	Due at the end of class when indicated. **Late HW is not accepted.**
CRN#	***** CHEM F671 F01 Receptor Pharmacology
Blackboard Access	All Powerpoint slides used in class as well as reading material will be posted on UAF Blackboard at https://classes.uaf.edu UAA and UAS students who register for the class will be assigned a username and password to login to UAF Blackboard. Contact our computer help desk at helpdesk@alaska.edu, 800 478-8226 or 907 450-8300 to ask about your user ID and password.
Course Description:	This course will teach students to: 1) understand basic drug receptor theory; 2) be familiar with assays to assess affinity and efficacy of receptor ligands 3) work with and interpret functional assays and radioligand binding results 4) to critically evaluate original research regarding receptor pharmacology with an emphasis on ligand-gated ion channels and G-protein coupled receptors; 5) identify testable hypotheses and design experiments to test these hypotheses. Prerequisite: Upper division or graduate biochemistry or neurochemistry course or permission of instructor. BIO 417 Neurobiology is recommended.

Learning Outcomes

1. Students will be able to defend the operational model of receptor function described by Black and Leff, 1983 and recognize concepts and equations from classical models that led to the operational model.
2. Students will be able to draw models of receptor function and receptor antagonism and derive equations that describe fractional occupancy or fractional response as a function of drug concentration.
3. Students will use Excel to calculate response as a function of drug concentration from expressions of fractional occupancy or fractional response derived from models of receptor function.
4. Students will use GraphPad (Prisim) software to perform nonlinear fits of simulated and actual data to equations derived from theoretical models of drug-receptor interaction.
5. Students will critically evaluate experimental design, detailed methods and data interpretation in peer-reviewed literature pertaining to receptor pharmacology and drug discovery.

Required Reading:

A Pharmacology Primer, Third Edition: Theory, Application and Methods
Terry Kenakin, ISBN 978-0-12-374585-9

Original research and review articles to be assigned

Homework, and Grading:

Homework (60%) will consist of approximately 10 take home assignments (3 points each). 3 points for excellent (complete and correct); 2 points for satisfactory (incomplete but correct or complete but partially correct; 1 unsatisfactory (partially correct and partially complete). Example assignments are as follows:

1. Draw a model and derive the equation that describes fractional receptor occupancy as a function of drug concentration.
2. Use published values for Kd and Ki to critically evaluate specificity and selectivity of drugs used in peer reviewed literature.
3. Use the operational model to describe the relationship between drug concentration and receptor occupancy, receptor occupancy and effect and drug concentration and functional response. Define τ and Ke and defend the advantages of the operational model over classical models of drug receptor interaction.
6. Prepare and discussion of a peer reviewed paper on a topic related to course material. Identify limitations in experimental design, detailed methods and data interpretation
7. Use Excel to calculate response as a function of drug concentration from expression of fractional occupancy or fractional response derived from a given model of receptor function. Fit simulated results to appropriate equation using Graph Pad (Prism) software.

Presentation of peer reviewed, original research paper (20%) to be graded on the basis of clarity and completeness in presentation of the following:

1. Introduction to problem and significance of problem
2. Explanation of experimental design and approach in the context of drug-receptor interaction models discussed in class.
3. Results
4. Critique of approach, methods, use of models and other aspects of the research.
5. Summary of significance noting caveats due to limitations of approach or experimental design.

Final exam (20%) will consist of a selection of modified homework assignments.

See schedule for when homework is due. Permission to hand-in HW via e-mail may be arranged in advance and will not be accepted without prior arrangements. Late homework will not be accepted unless arrangements are made before the homework is late. The letter grades assigned will be based on the overall performance of the class but will usually be in the range 90-100=A, 80-90=B, 70-79=C, 60-69=D, and below 60 is failing.

Published work must be cited to identify the source of the work and to acknowledge author's contributions. Evidence of plagiarism will lower the overall score on a homework assignment or project. Plagiarism includes the following:

- to steal and pass off (the ideas or words of another) as one's own
- to use (another's production) without crediting the source
- to commit literary theft
- to present as new and original an idea or product derived from an existing source.

Disabilities:

The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. Dr. Drew will work with the Office of Disabilities Services (*208 WHIT, 474-5655) to provide reasonable accommodation to students with disabilities.

Course Schedule (tentative)

Date		Topic	Homework due
Jan	20	What is pharmacology	
	25	How different tissues process drug response	
	27	Drug receptor theory	
Feb	1	Introduction to Graph Pad and simulated results	
	3	Pharmacological Assay Formats: Binding	Simulated results for agonist binding
	8	Discussion of paper 1	
	10	Assumptions used when fitting data with Graph Pad	Critical review of paper 1
	15	Discussion of paper 2	Graph Pad fit of binding data
	17	Agonists: the measurement of affinity and efficacy in functional assays	Critical review of paper 2
	22	Ligand gated ion channels	
	24	Discussion of paper 3	Graph Pad fit of functional data
Mar	1	G-protein coupled receptors	Critical review of paper 3
	3	Discussion of paper 4	Graph Pad fit of ^{35}SGTPγS data
	8	Drug Antagonism	Critical review of paper 4
	10	No class	
	15	Spring break	
	17	Spring break	
	22	Adenylate cyclase assays	Simulated results of competition experiment
	24	Discussion of paper 5	Graph Pad fit of cAMP production
	29	Drug Antagonism continued	Critical review of paper 5
	31	No class	Graph Pad fit of inhibition of ^{35}SGTPγS binding
Apr	5	Assessing coupling of GPCR	Simulated results and Graph Pad fit of noncompetitive antagonism
	7	Discussion of paper 6	
	12	Allosteric modulators	Critical review of paper 6
	14	Student led discussion of original research or selected paper	Simulated results and Graph Pad fit of allosteric modulation of ^{35}SGTPγS binding
	19	Student led discussion of original research or selected paper	
	21	Student led discussion of original research or selected paper	
	26	Student led discussion of original research or selected paper	
	28	Final Exam	