

v10-day

26-GCCh.

RECEIVED SEP 2 8

(sigal) FORMAT 2

Submit originals (including syllabus) and one copy and electronic copy to the **Faculty Senate Office**
See <http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures/> for a complete description of the rules governing curriculum & course changes.

CHANGE COURSE (MAJOR) and DROP COURSE PROPOSAL

Attach a syllabus, except if dropping a course.

SUBMITTED BY:

Department	Chemistry and Biochemistry	College/School	CNSM
Prepared by	William Simpson	Phone	907 474 7235
Email Contact	wrsimpson@alaska.edu	Faculty Contact	Kelly Drew

1. COURSE IDENTIFICATION: As the course now exists.

Dept	Chem	Course #	F474 / 676	No. of Credits	3
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COURSE TITLE

Neurochemistry

RECEIVED

2. ACTION DESIRED: Check the changes to be made to the existing course.

SEP 2 1 2012

Change Course	XX	If Change, indicate below what is changing.	Drop Course	
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Dean's Office

College of Natural Science & Mathematics

NUMBER		TITLE		DESCRIPTION	
PREREQUISITES*		FREQUENCY OF OFFERING			

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

Reference the registration implications below due to Banner coding of these terms:

Prerequisite: Course completed and grade of "C" (2.0) or higher prior to registering for the course that requires it.

Concurrent: Course may be taken simultaneously (and allows for a course to have been previously completed).

Co-requisite: Courses MUST be taken simultaneously and does NOT allow for fact that a course was previously completed!

CREDITS (including credit distribution)	3	COURSE CLASSIFICATION	
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ADD CROSS-LISTING

See #8 if intent is to stop an existing cross-listing.

STACKED (400/600)

Include syllabi.

Dept.	Chem	Course #	676 (proposed)
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(Requires approval of both departments and deans involved. Add lines at end of form for additional signatures.)

Stacked course applications are reviewed by the (Undergraduate) Curricular Review Committee and by the Graduate Academic and Advising Committee. Creating two different syllabi—undergraduate and graduate versions—will help emphasize the different qualities of what are supposed to be two different courses. The committees will determine: 1) whether the two versions are sufficiently different (i.e. is there undergraduate and graduate level content being offered); 2) are undergraduates being overtaxed? 3) are graduate students being undertaxed? In this context, the committees are looking out for the interests of the students taking the course. Typically, if either committee has qualms, they both do. More info online – see URL at top of this page.

OTHER (please specify)

3. 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 and the appropriate Faculty Senate curriculum committee. Furthermore, any core course compressed to less than six weeks must be approved by the core review committee.

COURSE FORMAT: (check all that apply)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input checked="" type="checkbox"/> 6 weeks to full semester
OTHER FORMAT (specify all that apply)						
Mode of delivery (specify lecture, field trips, labs, etc)	In class (lecture)					

4. 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	x
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IF YES*, check which core requirements it could be used to fulfill:

Governance
9/27/12 TLP

O = Oral Intensive,
*Format 6 also submitted

W = Writing Intensive, *Format 7
submitted

Natural Science, *Format 8
submitted

4.A Is course content related to northern, arctic or circumpolar studies? If yes, a "snowflake" symbol will be added in the printed Catalog, and flagged in Banner.

YES

NO ☒

5. COURSE REPEATABILITY:

Is this course repeatable for credit?

YES

NO ☒

Justification: Indicate why the course can be repeated
(for example, the course follows a different theme each time).

How many times may the course be repeated for credit?

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?

CREDITS

6. **COMPLETE CATALOG DESCRIPTION** including dept., number, title, credits, credit distribution, cross-listings and/or stacking, clearly showing the changes you want made. (Underline new wording ~~strike through old wording~~ and use complete catalog format including dept., number, title, credits and cross-listed and stacked.)

Example of a complete description:

PS F450 Comparative ~~Aboriginal~~ Indigenous Rights and Policies (s)

3 Credits

Offered As Demand Warrants

~~Case study~~ Comparative approach in ~~assessing Aboriginal~~ analyzing Indigenous rights and policies in different nation-state systems. ~~Seven Aboriginal situations~~ Multiple countries and specific policy developments examined for factors promoting or limiting self-determination. Prerequisites: Upper division standing or permission of instructor. (Cross-listed with ANS F450.) (3+0)

We are requesting to add a stacked graduate course to the existing catalog. No change to the existing course (Chem F474)

7. **COMPLETE CATALOG DESCRIPTION AS IT SHOULD APPEAR AFTER ALL CHANGES ARE MADE:**

Add the following, no change to Chem F474

Chem F676 Neurochemistry

3 credits Offered Spring Even-numbered years

This course is designed to teach graduate students critical thinking skills and experimental design in basic and applied aspects of interneuronal signaling. Lectures will be based on chapters from assigned text as well as current literature relevant to these topics. Critical thinking skills and experimental design will be taught through discussion of original research papers that relate to the lecture topic. Prerequisites: Graduate standing or permission of instructor (3+0)

8. **IS THIS COURSE CURRENTLY CROSS-LISTED?**

YES/NO ☐ no

If Yes, DEPT

NUMBER

DROPPING A CROSS-LISTING:

YES ☐

DEPT

NUMBER

Changing or dropping requires written notification of each department and dean involved. **Attach a copy of written notification.**

9. GRADING SYSTEM: *Specify only one.*

LETTER: ☒ **XX**

PASS/FAIL: ☐

10. ESTIMATED IMPACT

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

This course provides a graduate-level stacked version of an existing course (Chem F474) that can provide opportunity to graduate students to learn critical thinking skills and apply these skills to the material presented to undergraduates. Challenging graduate students in critical thinking will also inspire critical thinking in the undergraduate students. Thus, it expands the offerings while using time of the faculty member already committed to teaching a course. There will be some increased work to the faculty member, but they would like to provide this opportunity to students.

11. 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

☒ **XX**

The current journal holdings are sufficient for this course and will be utilized extensively. Contacted Karen Jensen and Anne Christie (9-18-2012). Karen has explained the situation re Elsevier access -- so far, it has worked out well for UAF re increased access.

A piece of good news is that the library provides online access to the 8th edition of Basic Neurochemistry: Molecular, Cellular and Medical Aspects which should be helpful to students as well as owning a paper copy which could go on Reserve.

With respect to library databases, we have PubMed, Web of Science and BIOSIS Previews.

12. 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 in chemistry, biology and psychology may take this course. The chemistry department will be impacted by instructor workload.

13. POSITIVE AND NEGATIVE IMPACTS

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

Positive impact will be to increase course offerings for BMB students and other students interested in neuroscience. Negative impacts are none.

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. If you ask for a change in # of credits, explain why; are you increasing the amount of material covered in the class? If you drop a prerequisite, is it because the material is covered elsewhere? If course is changing to stacked (400/600), explain higher level of effort and performance required on part of students earning graduate credit. Use as much space as needed to fully justify the proposed change and explain what has been done to ensure that the quality of the course is not compromised as a result.

Higher level of effort and performance required of students earning graduate credit will prepare these students to:

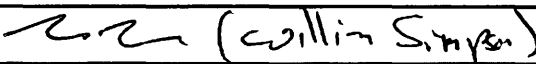
- Be familiar with current literature related to functions and diseases associated with neurotransmitter/neuromodulator
- Be able to critically evaluate published papers and prepare written comments addressing limitations to experimental design, experimental approach and interpretation of results.
- Be able to suggest means to improve a manuscript that are sufficient and appropriate to submit as comments to authors when invited to peer review a manuscript.


- Be able to form hypothesis about structure activity relationships between endogenous neurotransmitter, agonists and antagonists.


Graduate students will be evaluated for higher level of performance on critical thinking skills through a final project as described:

A final project will consist of one of the following: Prepare a 5 page research proposal for hypothesis driven research that may be related to but does not duplicate the student's thesis research project; or Write a manuscript based on results and methods provided by the instructor. Final projects will be evaluated on accurate development of background knowledge and statement of a testable hypothesis, compelling discussion of significance appropriate for a particular funding agency or audience, overall rigor of experimental design or discussion of caveats that limit interpretation or application of research findings. Discussion of alternative approaches that could diminish limitations.

APPROVALS: (Additional signature blocks may be added as necessary.)

	Date	20 Sep 2012
Signature, Chair, Program/Department of: <u>Chemistry and Biochemistry</u>		

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

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

Offerings above the level of approved programs must be approved in advance by the Provost:

	Date	
Signature of Provost (if applicable)		

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

	Date	
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Signature, Chair

Faculty Senate Review Committee: ☐ Curriculum Review ☐ GAAC

☐ Core Review ☐ SADAC

ATTACH COMPLETE SYLLABUS (as part of this application).

The guidelines are online:

<http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/uaf-syllabus-requirements/>

The Faculty Senate 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 (or changes to it) may 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.) ☐ Publicize UAF regulations with regard to the grades of "C" and below as applicable to this course. (Not required in the syllabus, but may be a convenient way to publicize this.) Faculty Senate Meeting #171:

<http://www.uaf.edu/uafgov/faculty-senate/meetings/2010-2011-meetings/#171>

11. Support Services:

- ☐ Describe the student support services such as tutoring (local and/or regional) appropriate for the course.

12. Disabilities Services: Note that the phone# and location have been updated.

The Office of Disability Services implements the Americans with Disabilities Act (ADA), and ensures that UAF students have equal access to the campus and course materials.

- ☐ State that you will work with the Office of Disabilities Services (208 WHITAKER BLDG, 474-5655) to provide reasonable accommodation to students with disabilities.

8/1/2012

Chemistry 474: Neurochemistry

CRN: 39000

Instructor: Dr. Kelly Drew
Office/office hrs: 104 Irving I, MWF 10-12:00
Telephone: 474- 7190
e-mail: kdrew@alaska.edu
fax: 474-6967
Lecture: MWF 3:30-4:30, Reichardt Room 165
Homework: Assignments posted on course schedule are due at the beginning of the next class unless otherwise indicated. **Late HW is not accepted.**
Homework and reading assignments (other than from the text book) will be posted on blackboard

Home-work make-up: Attend neuroscience seminars. A write-up about a seminar will substitute for one HW assignment (peer-reviews of selected articles). Up to 3 HW assignments can be substituted by a seminar write-up.

Course Description: Course will cover basic and applied aspects of interneuronal signaling of specific neurotransmitter systems. Lectures will be based on chapters from assigned text as well as recent and historical literature relevant to these topics. Basic concepts introduced in lectures will be applied through guided discussion of original research papers. Students will learn to prepare "peer reviews" of selected papers.

Course objectives Prerequisite: BIOL F115 and CHEM F322; and PSY F335, or BIOL B417 or CHEM F470
Lectures, exams and quizzes will focus on the following objectives for each neurotransmitter/neuromodulator discussed.

- Know functions and diseases associated with neurotransmitter/neuromodulator
- Recognize structure activity relationships and structural similarities between endogenous neurotransmitter, agonists and antagonists.
- Be able to address detailed mechanisms of neurochemical transmission
- Synthesis
- Storage
- Regulated release
- Receptor subtypes and effectors
- Termination of effect
- Know basic neurochemical anatomy of transmitter system

(Homework) Students will be guided by the instructor through critical evaluation of peer-reviewed papers to achieve the following objectives:

- Know how to decipher a scientific paper
- Know how to interpret data presented in formats typical of scientific papers
- Know how to critically evaluate experimental design, graphical representation of data and conclusions drawn from data shown and defend one's own interpretation of the data.
- Know how to prepare a peer-review of a submitted manuscript when invited by a journal's editor.

(Thinking like a neurochemist group project assignment) Students will be guided through oral presentations of original research towards the following objectives:

- Become familiar with data bases and original literature related to a topic of interest in neurochemistry
- Know effective techniques for oral presentation of original research
- Know effective techniques for optimizing positive group dynamics and productivity as a team player and as a group leader.

Text: Basic Neurochemistry: Molecular, Cellular and Medical Aspects by George J. Siegel (Editor), 8th edition (if you can get it). Otherwise 7th edition should suffice.

Other Required Reading: Original research and review articles to be assigned

Homework, Exams and Exams and quizzes will typically consist of a subset of review questions provided in class. See

Grading:

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. There will be no make-up exams or quizzes except under **extreme** circumstances. If such circumstances arise notify Dr. Drew (474-7190) **before** the scheduled time of the exam. If a make-up exam is approved it must be completed within 1 week of the original exam. Any student suspected by the instructor of cheating on a quiz or exam may be assigned a course grade of F; course drop forms will not be signed in these cases. **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.

Add a book; drop a quiz option

You may choose to read one of the following books OR, journal your impressions of 3, online seminars at <http://neuroseries.info.nih.gov/> and drop one quiz grade. You will be asked to hand in a book report to verify that you read the book, or turn in your journal kept while watching the seminars.

Molecules Of Emotion: The Science Behind Mind-Body Medicine (Paperback) by Candace B. Pert; ISBN: 9780684846347

Apprentice to Genius: The Making of a Scientific Dynasty by Robert Kanigel; ISBN: 9780801847578

Books by Oliver Sacks, MD (professor of neurology and psychiatry at Columbia University):
Awakenings The Man Who Mistook His Wife for a Hat: And Other Clinical Tales, Musicophilia: Tales of Music and the Brain, The Mind's Eye.

Disabilities:

Students with a physical or learning disability are required to identify themselves to Mary Matthews (x 7043) in the Disability Services office, located in the Center for Health and Counseling. The student must provide documentation of the disability. Disability Services will then notify Prof. Drew of special arrangements for taking tests, working homework assignments, and doing lab work.

Assignments for Chemistry 474, Spring 2010

2 Exams (100 pts ea.)	200 pts
3 Quizzes or 2 quizzes + optional (25 pts ea.)	75 pts
Presentations of original research papers	75 pts
Comprehensive final exam	100 pts
Homework (10 pts ea.) + 10peer review	~150 pts

Course Schedule

Last Updated: 9/20/2012 4:09 PM

Date		Lecture #		Topic and Reading Assignments (Reading assignments will usually be discussed in the next class)	Hand-outs and Homework (HW is due at the beginning of the next class period after it is assigned and listed below)
Jan	20	F	1	<p>Introduction to chemistry and the brain http://www.youtube.com/watch?v=bqkUbiUkR5k&feature=relmfu Read http://www.nature.com/nature/journal/v467/n7319/full/nature09510.html</p> <p>Review Chapter "Synaptic transmission and cellular signaling"</p>	<p>HW: Write a review of http://www.nature.com/nature/journal/v467/n7319/full/nature09510.html 1. Briefly summarize the findings 2. Note what aspect of the report makes you trust the results or conclusions. 3. Note what aspect of the report makes you doubt the results or conclusions.</p>
	23	M	2	<p>Techniques Optogenetics http://www.youtube.com/watch?v=I64X7vHSHOE</p> <p>Immunohistochemistry http://en.wikipedia.org/wiki/Immunohistochemistry</p>	<p>HW: 1. Explore professional access to topics in neuroscience and neurochemistry (Handout) 2. Short essay: Is science truth?</p> <p>Recommended: Lies, Damned Lies, and Medical Science http://m.theatlantic.com/magazine/archive/2010/11/lies-damned-lies-and-medical-science/8269/</p>
	25	W	3	<p>Serotonin</p> <p>Article 1: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3071248/?tool=pubmed</p>	<p>HW: Description of Article 1 (take home message from each figure and 3 questions to address when reading the text)</p>
	27	F	4	<p>Discussion of Article 1 How to write a critical review of an original research paper</p>	<p>Form for Peer-Review of Manuscript</p> <p>HW: Critical review of Article 1</p>
Jan	30	M	5	<p>Serotonin continued</p> <p>Article 2: http://www.sciencemag.org/content/333/6042/637.full FYI: http://www.sciencemag.org/content/suppl/2011/07/27/333.6042.637.DC1/Ray.SOM.pdf</p>	<p>HW: Description of Article 2 (take home message from each figure and 3 questions to address when reading the text)</p>
Feb	1	W	6	<p>Discussion of Article 2</p> <p>Serotonin continued</p> <p>Read: http://en.wikipedia.org/wiki/Receptor_theory</p>	<p>HW: Critical review of Article 2</p>
	3	F	7	<p>Basic Pharmacology</p> <p>Review: http://pdsp.med.unc.edu/kidb.php</p>	<p>HW: Hand-in 3 original research papers to consider for group presentation. Indicate impact factor of journal for each paper.</p>
	6	M	8	<p>Basic Pharmacology continued</p> <p>Read: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2784146/pdf/nihms146111.pdf http://onlinelibrary.wiley.com/doi/10.1111/j.1749-6632.1990.tb16915.x/pdf</p>	

	8	W		<p>Quiz 1 (take home) and meet with groups to select a paper for projects and prepare a timeline for preparing for presentation on 2/17</p> <p>Read: http://www.nature.com/nature/journal/v447/n7143/full/447368a.html</p>	<p>Group meeting/select paper. Title, time line and copy of paper due by end of class.</p> <p>Take home quiz due Friday</p>
	10	F	9	<p>Catecholamines</p> <p>Read chapter on catecholamines</p>	
	13	M	10	No class	
	15	W	11	No class	
	17	F	12	Group Presentations (1)	
	20	M	13	<p>Using PET to image neurochemistry of the brain http://www.dnalc.org/view/1152-Positron-Emission-Tomography-PET-.html</p> <p>Catecholamines continued</p> <p>Article 3: http://jpet.aspetjournals.org/content/early/2012/01/03/jpet.111.189076.long or Salimpoor et al., 2011 http://www.nature.com/neuro/journal/v14/n2/full/nn.2726.html</p>	<p>HW: Description of Article 3 (take home message from each figure and 3 questions to address when reading the text)</p>
	22	W	14	Discussion of Article 3	HW: Critical review of Article 3
	24	F	15	CA continued or Small group discussion of review questions to review for Exam I ; Group meeting and select paper	HW: Hand-in 3 original research papers to consider for group presentation. Indicate impact factor of journal for each paper.
	27	M		Exam I (lectures 1-15)	
	29	W	16	<p>Histamine</p> <p>Read chapter on Histamine</p> <p>Article 4: Espana and Scammel, 2011 http://www.ncbi.nlm.nih.gov/pubmed/21731134</p>	HW: Description of Article 4 (take home message from each figure and 3 questions to address when reading the text)
Mar	2	F	17	Discuss Article 4	HW: Critical Review of Article 4
	5	M	18	<p>Glutamate</p> <p>Read chapter on Glutamate</p>	
	7	W	19	<p>Glutamate continued</p> <p>Article 5: Dash et al., 2009 http://www.jneurosci.org/content/29/3/620.full or http://www.pnas.org/content/99/22/14488.full.pdf+html?withds=yes or State-dependent changes in astrocyte regulation of extrasynaptic NMDA receptor signalling in neurosecretory neurons <i>J Physiol August 15, 2011 589 (16) 3929-3941 (see link in course documents on black board)</i></p>	
	9	F		<p>Glutamate finale</p> <p>Article 5 Scannevin and Haganir, 2000 http://www.nature.com/nrn/journal/v1/n2/full/nrn1100_133a.html or MacGillavry et al., 2011 http://www.sciencedirect.com/science/article/pii/S1044743111001965</p>	<p>HW: Description of Article 5 (take home message from each figure and 3 questions to address when reading the text) NOTE that these are review papers</p>
	12	M		Spring Break	

	14	W		Spring Break	
	16	F		Spring Break	
	19	M	20	Group Presentations (3)	
	21	W	21	Discussion of Article 5	HW: Critical Review of Article 5
	23	F	22	Glutamate finale (make up)	
	26	M		GABA and Glycine (Read Chapter)	
	28	W	24	GABA and Glycine continued	
	30	F		Quiz 2 Article 6 http://ajpregu.physiology.org/content/300/2/R272.full.pdf+html	HW: Description of Article 6 (take home message from each figure and 3 questions to address when reading the text)
April	2	M	25	Discussion of Article 6	HW: Critical Review of Article 6
	4	W	26	Purinergic Systems (read chapter)	
	6	F	27	Purinergic Systems	
	9	M	28	Exam II Read Magistretti 2009 low cost travel in neurons http://www.sciencemag.org/content/325/5946/1349.full	
	11	W	29	Energy Metabolism in the Brain (Read chapter)	
	13	F		Hypoxic-Ischemic Brain Injury (read chapter) The Treasure Hunt Submitted by Shiree Heath, BS http://www.sfn.org/index.aspx?pagename=bavideo_winners How it feels to have a stroke (Jill Bolte Taylor) http://www.youtube.com/watch?v=UyyjU8fzEYU Campos et al., 2011 http://www.sciencedirect.com/science/article/pii/S1357272511003013	
	16	M	30	Hypoxic-Ischemic Brain Injury continued	HW: Hand-in 3 original research papers to consider for group presentation. Indicate impact factor of journal for each paper.
	18	W	31	Peptides (Read chapter)	
	20	F	32	Peptides continued Read Harwood 2011 http://www.sciencedirect.com/science/article/pii/S0028390811005144	Group meeting/select paper. Title, time line and copy of paper due by end of class.
	23	M	33	Endocannabinoids	
	25	W	34	Endocannabinoids and energy regulation Gamage and Lichtman, 2012 http://onlinelibrary.wiley.com/doi/10.1002/pbc.23367/pdf	

	27	F	35	Gaseous neurotransmitters (NO, CO, H ₂ S)	
				Kilduff et al., 2011 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3014438/?tool=pubmed	
	30	M	36	Group Presentations (3)	
		W	37	Quiz 3	
		F	38	Review	
May	7	3:15-5:15		Comprehensive Final Exam	
					All make up assignments are due, 10:00 am Grades must be posted by May 16, 12:00pm

Chemistry 676: Neurochemistry

Instructor: Dr. Kelly Drew
Office/office hrs: 104 Irving I, MWF 10-12:00
Telephone: 474- 7190
e-mail: kdrew@alaska.edu
fax: 474-6967
Lecture: MWF 3:30-4:30, Reichardt Room 165 (coincides with lectures for chem. 474)
Homework: Assignments posted on course schedule are due at the beginning of the next class unless otherwise indicated. **Late HW is not accepted.**
Homework and reading assignments (other than from the text book) will be posted on blackboard

Home-work make-up: Attend neuroscience seminars. A write-up about a seminar will substitute for one HW assignment (peer-reviews of selected articles). Up to 3 HW assignments can be substituted by a seminar write-up.

Course Description: This course is designed to teach graduate students critical thinking skills and experimental design in basic and applied aspects of interneuronal signaling. Lectures will be based on chapters from assigned text as well as current literature relevant to these topics. Critical thinking skills and experimental design will be taught through discussion of original research papers that relate to the lecture topic.

Prerequisite: BIOL B417, CHEM F470 or equivalent instruction in basic cell and molecular biology and nervous system function.

Course objectives Lectures, exams and quizzes will focus on the following objectives for each neurotransmitter/neuromodulator discussed.

- Be familiar with current literature related to functions and diseases associated with neurotransmitter/neuromodulator
- Be able to critically evaluate published papers and prepare written comments addressing limitations to experimental design, experimental approach and interpretation of results.
- Be able to suggest means to improve a manuscript that are sufficient and appropriate to submit as comments to authors when invited to peer review a manuscript.
- Be able to form hypothesis about structure activity relationships between endogenous neurotransmitter, agonists and antagonists.
- Be able to discuss detailed mechanisms of neurochemical transmission listed below and to design experiments to test hypotheses regarding these mechanisms and the physiological functions related to these processes.
 - Synthesis
 - Storage
 - Regulated release
 - Receptor subtypes and effectors
 - Termination of effect
- Know the basic neurochemical anatomy of transmitter systems and be able to design experiments to study neurochemical anatomy

(Homework) Students will be guided by the instructor through critical evaluation of peer-reviewed papers to achieve the following objectives:

- Apply knowledge of neurochemical transmission to interpretation of peer reviewed papers.
- Apply knowledge of neurochemistry and experimental design to critically evaluate original research papers and literature reviews.
- Develop critical thinking skills and oral and written communication styles to defend one's own interpretation of the data.
- Know how to prepare comments for authors to be submitted in response to an invitation by a journal editor to review a manuscript.

(Group project assignment) Students will gain practice with oral presentations of original research towards the following objectives:

- Become familiar with original literature related to a topic of interest in neurochemistry
- Develop effective techniques for oral presentation of original research
- Develop effective techniques for optimizing positive group dynamics and productivity as a team player and as a group leader.

Text:	Basic Neurochemistry: Molecular, Cellular and Medical Aspects by George J. Siegel (Editor), 8th edition.
Other Required Reading:	Original research and review articles as assigned
Homework, Exams and Grading:	Exams and quizzes will typically consist of a subset of review questions provided in class. 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. There will be no make-up exams or quizzes except under extreme circumstances. If such circumstances arise notify Dr. Drew (474-7190) before the scheduled time of the exam. If a make-up exam is approved it must be completed within 1 week of the original exam. Any student suspected by the instructor of cheating on a quiz or exam may be assigned a course grade of F; course drop forms will not be signed in these cases. 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.
Drop a quiz option	Students may attend up to 3 online seminars at http://neuroseries.info.nih.gov/ and write a critical review of each presentation addressing areas for improvement in slide formatting/graphics, development of background and significance appropriate for the audience, communication of a hypothesis and overall rigor of experimental design, clarity of results, soundness of interpretation and discussion of caveats that limit interpretation or application of research findings. These 3 critical reviews may substitute for one quiz grade.
Final Project	A final project will consist of one of the following: Prepare a 5 page research proposal for hypothesis driven research that may be related to but does not duplicate the student's thesis research project; or Write a manuscript based on results and methods provided by the instructor. Final projects will be evaluated on accurate development of background knowledge and statement of a testable hypothesis, compelling discussion of significance appropriate for a particular funding agency or audience, overall rigor of experimental design or discussion of caveats that limit interpretation or application of research findings. Discussion of alternative approaches that could diminish limitations.
Disabilities	Students with a physical or learning disability are required to identify themselves to Mary Matthews (x 7043) in the Disability Services office, located in the Center for Health and Counseling. The student must provide documentation of the disability. Disability Services will then notify Prof. Drew of special arrangements for taking tests, working homework assignments, and doing lab work.

Assignments for Chemistry 675

2 Exams (100 pts ea.)	200 pts
3 Quizzes or 2 quizzes + optional (25 pts ea.)	75 pts
Presentations of original research papers	75 pts
Comprehensive final exam	100 pts
Homework (10 pts ea.) + 10peer review	~150 pts
Final Project (100 pts)	<u>(100 pts added to total possible)</u>

Course Schedule

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Date		Lecture #		Topic and Reading Assignments (Reading assignments will usually be discussed in the next class)	Hand-outs and Homework (HW is due at the beginning of the next class period after it is assigned and listed below)
Jan	20	F	1	<p>Introduction to chemistry and the brain http://www.youtube.com/watch?v=bqkUbiUkR5k&feature=relmfu Read http://www.nature.com/nature/journal/v467/n7319/full/nature09510.html</p> <p>Review Chapter "Synaptic transmission and cellular signaling"</p>	<p>HW: Write a review of http://www.nature.com/nature/journal/v467/n7319/full/nature09510.html 1. Briefly summarize the findings 2. Note what aspect of the report makes you trust the results or conclusions. 3. Note what aspect of the report makes you doubt the results or conclusions.</p>
	23	M	2	<p>Techniques Optogenetics http://www.youtube.com/watch?v=I64X7vHSHOE</p> <p>Immunohistochemistry http://en.wikipedia.org/wiki/Immunohistochemistry</p>	<p>HW: 1. Explore professional access to topics in neuroscience and neurochemistry (Handout) 2. Short essay: Is science truth?</p> <p>Recommended: Lies, Damned Lies, and Medical Science http://m.theatlantic.com/magazine/archive/2010/11/lies-damned-lies-and-medical-science/8269/</p>
	25	W	3	<p>Serotonin</p> <p>Article 1: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3071248/?tool=pubmed</p>	<p>HW: Description of Article 1 (take home message from each figure and 3 questions to address when reading the text)</p>
	27	F	4	<p>Discussion of Article 1 How to write a critical review of an original research paper</p>	<p>Form for Peer-Review of Manuscript</p> <p>HW: Critical review of Article 1</p>
Jan	30	M	5	<p>Serotonin continued</p> <p>Article 2: http://www.sciencemag.org/content/333/6042/637.full FYI: http://www.sciencemag.org/content/suppl/2011/07/27/333.6042.637.DC1/Ray.SOM.pdf</p>	<p>HW: Description of Article 2 (take home message from each figure and 3 questions to address when reading the text)</p>
Feb	1	W	6	<p>Discussion of Article 2</p> <p>Serotonin continued</p> <p>Read: http://en.wikipedia.org/wiki/Receptor_theory</p>	<p>HW: Critical review of Article 2</p>
	3	F	7	<p>Basic Pharmacology</p> <p>Review: http://pdsp.med.unc.edu/kidb.php</p>	<p>HW: Hand-in 3 original research papers to consider for group presentation. Indicate impact factor of journal for each paper.</p>
	6	M	8	<p>Basic Pharmacology continued</p> <p>Read: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2784146/pdf/nihms146111.pdf http://onlinelibrary.wiley.com/doi/10.1111/j.1749-6632.1990.tb16915.x/pdf</p>	

	8	W		<p>Quiz 1 (take home) and meet with groups to select a paper for projects and prepare a timeline for preparing for presentation on 2/17</p> <p>Read: http://www.nature.com/nature/journal/v447/n7143/full/447368a.html </p>	<p>Group meeting/select paper. Title, time line and copy of paper due by end of class.</p> <p>Take home quiz due Friday</p>
	10	F	9	<p>Catecholamines</p> <p>Read chapter on catecholamines</p>	
	13	M	10	No class	
	15	W	11	No class	
	17	F	12	Group Presentations (1)	
	20	M	13	<p>Using PET to image neurochemistry of the brain http://www.dnalc.org/view/1152-Positron-Emission-Tomography-PET-.html </p> <p>Catecholamines continued</p> <p>Article 3: http://jpet.aspetjournals.org/content/early/2012/01/03/jpet.111.189076.long or Salimpoor et al., 2011 http://www.nature.com/neuro/journal/v14/n2/full/nn.2726.html </p>	<p>HW: Description of Article 3 (take home message from each figure and 3 questions to address when reading the text)</p>
	22	W	14	Discussion of Article 3	HW: Critical review of Article 3
	24	F	15	CA continued or Small group discussion of review questions to review for Exam I ; Group meeting and select paper	HW: Hand-in 3 original research papers to consider for group presentation. Indicate impact factor of journal for each paper.
	27	M		Exam I (lectures 1-15)	
	29	W	16	<p>Histamine</p> <p>Read chapter on Histamine</p> <p>Article 4: Espana and Scammel, 2011 http://www.ncbi.nlm.nih.gov/pubmed/21731134 </p>	HW: Description of Article 4 (take home message from each figure and 3 questions to address when reading the text)
Mar	2	F	17	Discuss Article 4	HW: Critical Review of Article 4
	5	M	18	<p>Glutamate</p> <p>Read chapter on Glutamate</p>	
	7	W	19	<p>Glutamate continued</p> <p>Article 5: Dash et al., 2009 http://www.jneurosci.org/content/29/3/620.full or http://www.pnas.org/content/99/22/14488.full.pdf+html?withds=yes or State-dependent changes in astrocyte regulation of extrasynaptic NMDA receptor signalling in neurosecretory neurons <i>J Physiol August 15, 2011 589 (16) 3929-3941 (see link in course documents on black board)</i> </p>	
	9	F		<p>Glutamate finale</p> <p>Article 5 Scannevin and Haganir, 2000 http://www.nature.com/nrn/journal/v1/n2/full/nrn1100133a.html or MacGillavry et al., 2011 http://www.sciencedirect.com/science/article/pii/S1044743111001965 </p>	HW: Description of Article 5 (take home message from each figure and 3 questions to address when reading the text) NOTE that these are review papers
	12	M		Spring Break	

	14	W		Spring Break	
	16	F		Spring Break	
	19	M	20	Group Presentations (3)	
	21	W	21	Discussion of Article 5	HW: Critical Review of Article 5
	23	F	22	Glutamate finale (make up)	
	26	M		GABA and Glycine (Read Chapter)	
	28	W	24	GABA and Glycine continued	
	30	F		Quiz 2 Article 6 http://ajpregu.physiology.org/content/300/2/R272.full.pdf+html	HW: Description of Article 6 (take home message from each figure and 3 questions to address when reading the text)
April	2	M	25	Discussion of Article 6	HW: Critical Review of Article 6
	4	W	26	Purinergic Systems (read chapter)	
	6	F	27	Purinergic Systems	
	9	M	28	Exam II Read Magistretti 2009 low cost travel in neurons http://www.sciencemag.org/content/325/5946/1349.full	
	11	W	29	Energy Metabolism in the Brain (Read chapter)	
	13	F		Hypoxic-Ischemic Brain Injury (read chapter) The Treasure Hunt Submitted by Shiree Heath, BS http://www.sfn.org/index.aspx?pagename=bavideo_winners How it feels to have a stroke (Jill Bolte Taylor) http://www.youtube.com/watch?v=UyyjU8fzEYU Campos et al., 2011 http://www.sciencedirect.com/science/article/pii/S1357272511003013	
	16	M	30	Hypoxic-Ischemic Brain Injury continued	HW: Hand-in 3 original research papers to consider for group presentation. Indicate impact factor of journal for each paper.
	18	W	31	Peptides (Read chapter)	
	20	F	32	Peptides continued Read Harwood 2011 http://www.sciencedirect.com/science/article/pii/S0028390811005144	Group meeting/select paper. Title, time line and copy of paper due by end of class.
	23	M	33	Endocannabinoids	
	25	W	34	Endocannabinoids and energy regulation Gamage and Lichtman, 2012 http://onlinelibrary.wiley.com/doi/10.1002/pbc.23367/pdf	

	27	F	35	Gaseous neurotransmitters (NO, CO, H ₂ S)	
				Kilduff et al., 2011 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3014438/?tool=pubmed	
	30	M	36	Group Presentations (3)	
		W	37	Quiz 3	
		F	38	Review	
May	7	3:15-5:15		Comprehensive Final Exam	
May	14			Optional final project	Final project is due, 10:00 am Grades must be posted by May 16, 12:00pm