Course Description: Chemistry of cellular constituents; introduction to the chemical processes in living systems.

Learning Objectives:

1. You will develop an appreciation for the properties of amino acids, nucleic acids, carbohydrates and lipids, and the physicochemical forces that drive macromolecules (e.g., proteins, DNA, RNA, polysaccharides and lipids) to adopt specific two and three dimensional structures. You will learn how macromolecules are organized into higher ordered structures, and methods to purify and study the 2- and 3-dimensional structures of macromolecules.

2. You will learn how proteins catalyze enzymatic reactions, the synthesis of DNA, RNA and proteins, and principles behind the regulation of these processes.

3. You should be able to extrapolate knowledge that is presented in lectures, and discussions for solving theoretical problems, and be able to interpret the meaning of sets of theoretical data that is presented. This does not mean that you must memorize every bit of information, but rather that you should understand the underlying logic of how cellular processes are studied and how this knowledge can be applied to solve important scientific questions.

4. More generally, this course aims to prepare you to be a scientist. As a graduate student, you will develop skills in seeking more advanced information in the scientific literature and in your own lab work. For this course, this means that you should be able to appreciate the experimental foundations of the study of macromolecules and molecular biology. You should be able to critically assess the limits of this knowledge, and to creatively think about how you could gain further information through new experimentation and interpretation of new data. Finally, it is vital that you can communicate your own thoughts effectively, both in written and oral forms: that is to know the language and terminology used in this field of study.

I. Introduction (Chapt. 1, 3-19)
II. Thermodynamics and Free Energy (Chapt. 3, 52-63)
III. Water - Structure and forces (Chapt. 2, 40-45)
IV. Amino acids (Chapt. 2, 45-51, Chapt. 4, 67-81, Chapt. 6, 144-147, Chapt. 7, 169-171)
V. Proteins
   A. Structures
      1. Primary (Chapt. 7, 163-169, 170-175)
      2. Secondary (Chapt. 8, 221-232, Chapt. 9, 302-304)
      3. Tertiary (Chapt. 8, 232-266)
      4. Quaternary (Chapt. 8, 266-270, Chapt. 10, 331-334)
   B. Purification (Chapt. 6, 129-156)
   C. Folding and dynamics (Chapt. 9, 278-302, 306-319)
VI. Enzymes
A. Introduction (Chapt. 13, 469-473)
B. Catalysis (Chapt. 14, 484-487, Chapt. 15, 506-516)
C. Kinetics (Chapt. 13, 482-484, 487-505)
D. Allosterism (Chapt. 13, 474-479, Chapt. 10, 325-331, 334-341, 347-355)
E. Classification (Chapt. 13, 479)
F. Examples of mechanisms (Chapt. 15, 517-538, Chapt. 17, 600-603)

VII. Lipids (Chapt. 12, 386-399)
VIII. Membranes and transport (Chapt. 12, 399-411, 416-420, Chapt. 20, 744-771)
IX. Carbohydrates (Chapt. 11, 359-385)
X. Nucleic acids
A. Genetics and DNA (Chapt. 1, 19-28; Chapt. 5, 82-88)
B. Structures (Chapt. 5, 88-90, Chapt. 29, 1145-1151; Chapt. 34, W-53-W-68)
C. Physical properties (Chapt. 5, 90-94; Chapt. 6, 156-159; Chapt. 29, 1151-1172; Chapt. 34, W-68-W-74)
D. Hydrolysis (Chapt. 5, 104-108)
E. Cloning and Sequencing (Chapt. 5, 108-128; Chapt. 7, 176-185)

XI. Molecular biology
A. DNA replication (Chapt. 5, 90-91, 101-104; Chapt. 30, 1173-1213)
B. Mutation and repair (Chapt. 30, 1213-1225; Chapt. 34, W-134-W-135)
C. RNA synthesis (Chapt. 5, 95-98; Chapt. 31, 1260-1283; Chapt. 34, W-83-W-96)
D. RNA processing (Chapt. 31, 1301-1337)
E. Protein synthesis (Chapt. 5, 98-101; Chapt. 32, 1338-1398)

XII. Regulation of Gene expression
A. Transcription regulation (Chapt. 31, 1260-1264, 1283-1301; Chapt. 34, W-74-W-83, W-93-W-121)
B. Post-translational regulation and modification of proteins (Chapt. 32, 1398-1428; Chapt. 34, W-119-W-121, W-145-W-155)

EXAMS:
Exam I: 18 September, Tuesday –6:30-8:30 PM Sections I - V
Exam II: 16 October - Tuesday –6:30-8:30 PM Sections VI - VIII
Exam III: 13 November Tuesday –6:30-8:30 PM Sections IX – XI.A
Final exam 20 November Tuesday –6:30-8:30 PM 66% Material from Exam I & II, 34% Material from Exam III;
Exam IV: 14 December, Friday 10-11:50 AM Sections XI.B-XII

GRADING: All 2 hour exams are worth 20% of total.

TEXTS: Biochemistry, 4th Ed., D. Voet & J. G. Voet
(+other assigned readings)

POSSIBLY USEFUL: Core Topics in Biochemistry, J. Stenesh

D2L: https://my.okstate.edu

To join the meeting: http://dasnr.adobeconnect.com/bioc5753/
IMPORTANT DATES

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
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<tbody>
<tr>
<td>Last day to add a class (without instructor permission)</td>
<td>8/27/2018</td>
</tr>
<tr>
<td>Last day to drop a course with no grade and 100% refund</td>
<td>8/27/2018</td>
</tr>
<tr>
<td>Last day to drop a class (requires instructor &amp; advisor permission)</td>
<td>8/31/2018</td>
</tr>
<tr>
<td>Last day to drop a course or withdraw from the University with an automatic “W” and receive a partial refund (requires advisor signature)</td>
<td>8/31/2018</td>
</tr>
<tr>
<td>Last day to post 6 week grades</td>
<td>10/3/2018</td>
</tr>
<tr>
<td>Last day to file diploma application (for name to appear in Fall Commencement program)</td>
<td>11/1/2018</td>
</tr>
<tr>
<td>Last day to drop a course or withdraw from the University with an automatic “W”</td>
<td>11/9/2018</td>
</tr>
<tr>
<td>Last day to withdraw from all OSU classes with an assigned grade of “W” or “F”</td>
<td>11/30/2018</td>
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<tr>
<td>Pre-Finals Week</td>
<td>12/3/2018-12/7/2018</td>
</tr>
<tr>
<td>Final examinations</td>
<td>12/10/2018-12/14/2018</td>
</tr>
<tr>
<td>Final grades due from faculty</td>
<td>12/19/2018</td>
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</tbody>
</table>

Note: Outreach, Internet, and short courses have unique drop/add and refund deadlines; lookup the specific deadlines for these courses on the Short, Internet, and Outreach Class Schedules page of the Registrar’s website [http://registrar.okstate.edu/SIO-Schedule](http://registrar.okstate.edu/SIO-Schedule).

Fall Semester Holidays

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
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<tbody>
<tr>
<td>University Holiday</td>
<td>9/3/2018</td>
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<tr>
<td>Student’s Fall Break</td>
<td>10/19/2018</td>
</tr>
<tr>
<td>Student’s Thanksgiving Break</td>
<td>11/21/2018-11/23/2018</td>
</tr>
</tbody>
</table>

DROPPING A COURSE AND WITHDRAWING FROM THE UNIVERSITY

Dropping a Course (or courses) may occur during the first twelve weeks of the semester. This means, however, that you are still enrolled in at least one other OSU course. Exceptions to the deadlines above may only be considered by petition due to documented extraordinary circumstances and committee approval. The Retroactive Drop/Withdraw Petition and the Petition for a Refund of Tuition and Fees forms are available on the Registrar’s website [http://registrar.okstate.edu/Forms](http://registrar.okstate.edu/Forms).

Withdrawing from the university means dropping all courses and you are no longer enrolled for the current semester. This may occur until the Friday before pre-finals week. The withdrawal process is initiated with your academic advisor. For additional information and dates, go to [http://academicaffairs.okstate.edu/content/adding-dropping-and-withdrawing-courses](http://academicaffairs.okstate.edu/content/adding-dropping-and-withdrawing-courses).

ALERTS AND RESCHEDULING

If the OSU campus officially closes due to inclement weather or other emergencies, alerts are provided to local news media and posted on the OSU website. Missed exams, classes, or assignments may be rescheduled at times outside the normal meeting schedule. If valid, documented circumstances prohibit students from attending the rescheduled classes, instructors should provide reasonable alternative means for makeup.

SEEK ANSWERS TO YOUR QUESTIONS

The OSU faculty and staff want you to be successful in your educational pursuits. If you have questions or concerns, seek help EARLY. We are here to assist you.
FINAL EXAM OVERLOAD POLICY
In the event you have three or more final exams scheduled for a single day, you are entitled to arrange with the instructor of the highest numbered course (4 digit course number) or two highest, if you have four finals on one day, to re-schedule that examination(s) at a time and place of mutual convenience during final exam week. If the final exam overload includes a common final exam, the common final exam is excluded from rescheduling unless multiple common exams are scheduled at the same time. You should submit this request in writing, with a copy of your class schedule, at least two weeks prior to the beginning of final exam week. The instructor has one week prior to the beginning of final exam week to arrange a mutually convenient time and place for administration of the final exam. After one week, if an agreement cannot be reached, take the request to the department head.

INFORMATION TECHNOLOGY
Student Email - OSU uses your OKSTATE.EDU email address as a primary form of communication. Students are expected to check their OSU email on a frequent and consistent basis to remain informed of their official university business. If you do not use the OSU email system you must redirect your okstate.edu email using the Orange-Key System (www.okey.okstate.edu). Failure to maintain an accurate email address may result in missed or lost university communications. For email assistance contact the IT Helpdesk at 405-744-HELP (4357).

Computer Labs - A complete description of computer labs and hours of operations are available at their website: https://it.sharepoint.okstate.edu/TechnologySupport/DeskSide/default.aspx. Lab information is also available by calling the Information Technology Help Desk at 405-744-HELP (4357).

EQUAL OPPORTUNITY
408 Whitehurst/405-744-9153/https://1is2many.okstate.edu/
OSU is committed to maintaining a learning environment that is free from discriminatory conduct based on race, color, religion, sex, sexual orientation, gender identity, national origin, disability, age or protected veteran status. OSU does not discriminate on the basis of sex in its educational programs and activities. Examples of sexual misconduct and/or sex discrimination include: sexual violence, sexual harassment, sexual assault, domestic and intimate partner violence, stalking, or gender-based discrimination. OSU encourages any student who thinks that he or she may have been a victim of sexual misconduct or sexual discrimination to immediately report the incident to the Title IX Coordinator (405-744-9153) or Deputy Title IX Coordinator (405-744-5470). Students may also report incidents of sexual misconduct or sex discrimination to a faculty or staff member, who is then required by federal law (Title IX) to notify the Title IX or Deputy Title IX Coordinator. If a reporting student would like to keep the details confidential, the student may speak with staff in the Student Counseling Center (405-744-5472) or one of the University’s Sexual Assault Victim Advocates (Mon-Fri 8 AM-5 PM, 405-564-2129 or 24 Hour Help Line 405-624-3020).

STUDENT DISABILITY SERVICES
315 Student Union/405-744-7116/http://dis.okstate.edu/
According to the Americans with Disabilities Act, each student with a disability is responsible for notifying the University of his/her disability and requesting accommodations. If you think you have a qualified disability and need special accommodations, you should notify the instructor and request verification of eligibility for accommodations from Student Disability Services. Please advise the instructor of your disability as soon as possible, and contact Student Disability Services, to ensure timely implementation of appropriate accommodations. Faculty have an obligation to respond when they receive official notice of a disability but are under no obligation to provide retroactive accommodations. To receive services, you must submit appropriate documentation and complete an intake process to verify the existence of a qualified disability and identify reasonable accommodations.

STUDENT CONDUCT EDUCATION AND ADMINISTRATION
328 Student Union/405-744-5470/http://studentconduct.okstate.edu/
By enrolling at Oklahoma State University, you accept responsibility for complying with all University policies and contracts, and for local, state and federal laws on- or off-campus that relate to the University’s mission. The Student Code of Conduct educates students about their civic and social responsibilities including policies and procedures involving student misconduct.

In general, the University expects students to aspire to follow and promote the Cowboy Community Standards or integrity, community, social justice, respect, and responsibility.

EDMON LOW LIBRARY HOURS
405-744-9775 or 405-744-9741
www.library.okstate.edu
Sunday
Opens at 9:00 AM
Monday-Thursday
Open 24 hours
Friday
Closes at 10:00 PM
Saturday
9:00 AM-10:00 PM
*For holiday and intersession hours, check http://library.okstate.edu/about/hours

WHERE TO GO FOR HELP
ACADEMIC RELATED SERVICES
Instructor - If you have questions regarding your class, talk to your instructor. Faculty members usually include their office hours and/or phone number in the class syllabus. If you cannot locate this information, set a time to meet with your instructor by speaking with him/her prior to or immediately following your class session or check with the departmental office on when the instructor may be available.

Academic Advisor - All students will benefit by conferring with an advisor on a regular basis. If you do not know your advisor or would like to learn more, talk to the Student Academic Services Director for your college.

Bursar
113 Student Union/405-744-5993
http://bursar.okstate.edu/
The Bursar Office bills and collects tuition, fees, campus housing, and other university related charges. The Bursar Office also processes and disburses all federal and campus-based funds to students’ bursar accounts and refunds any overpayments on students’ bursar accounts.

Career Services
360 Student Union/405-744-5253
http://hireosugrads.com

Concurrent Student Services and Advising
University College/040 Student Union/405-744-1389
http://universitycollege.okstate.edu/concurrent/index.html
Find out about academic services for concurrent students or to schedule your next advising appointment.

Foreign Language Placement Test
206 Gunderson Hall/405-744-9547
http://languages.okstate.edu/
Students with prior foreign language experience in French, German, or Spanish who take the placement exam and then score a ‘B’ or higher in a more advanced class, will get up to 6 credit hours for the classes below it. Schedule your free test by emailing Nick Howland at nick.howland@okstate.edu.
Multicultural Affairs
240 Student Union/405-744-5481
http://oma.okstate.edu/
Academic, career, and personal success programs are available. Student organizations representing diverse communities and annual events are offered.

Pre-Professional Student Services
University College/040 Student Union/405-744-1389
http://universitycollege.okstate.edu/
Pre-professional services for students from any major on campus, including coordination of contacts with health care professional schools and student interview processes.

Registrar
322 Student Union/405-744-6876
http://registrar.okstate.edu/
The Registrar's Office provides services related to the creation and maintenance of student academic records, including assisting students with enrollment, official transcript requests, degree and enrollment verification, updating personal information in the Student Information System, graduation, and other services.

Scholarships & Financial Aid
119 Student Union/405-744-6604
http://financialaid.okstate.edu
Over 80 percent of Oklahoma State University students received scholarships, grants, work, and low-interest loans totaling over $320 million last year. Contact the Office of Scholarships & Financial Aid to apply for financial aid or to meet with a financial aid counselor.

Transfer Students Services
University College/104 North Classroom Building/405-744-1392
http://universitycollege.okstate.edu/transfer/index.html
This office provides undergraduate transfer students with a seamless transition to OSU by collaborating with various departments on campus, including the Undergraduate Admissions, the LASSO Center, the Registrar's Office, and Scholarships & Financial Aid.

University Assessment and Testing
107 University Assessment and Testing Building/405-744-5958
http://uat.okstate.edu/
Campus and national tests as well as testing accommodations are provided.

Veteran Benefit Services
322 Student Union/405-744-6343
http://registrar.okstate.edu/Veteran-Benefit-Services
This office provides information and assistance in completing the appropriate forms to apply for educational benefits through the U.S. Department of Veterans Affairs and through the State of Oklahoma.

University Counseling Services
320 Student Union/405-744-5458
http://www.okstate.edu/ucs/
Services include personal counseling, the Alcohol & Substance Abuse Center, and stress management through the Reboot Center.

University Health Services
1202 W. Farm Road/405-744-7665
http://uhs.okstate.edu/
An allergy clinic, lab services, x-ray, travel clinic, women's clinic and pharmacy are among the services offered at this campus outpatient medical clinic.

Wellness Department
405-744-5510
http://wellness.okstate.edu/
Intramurals, group fitness and sports clubs are among the many programs and services available through the Wellness Department.

CAMPUS LIFE RELATED SERVICES

Fraternity & Sorority Affairs
211J Student Union/405-744-5490
http://gogreek.okstate.edu/
For questions and comments about Greek life opportunities, contact Fraternity and Sorority Affairs.

Housing & Residential Life
100 Iba Hall/405-744-5592
http://reslife.okstate.edu
For questions and comments about housing and residential life, contact the Housing administration office.

Leadership and Campus Life
211 Student Union/405-744-5488
http://lcl.okstate.edu
Get involved through student organizations; the Center for Ethical Leadership; International Students & Scholars; Non-traditional Student Services; and Parent & Family Relations.

Service-Learning Volunteer Center
211G Student Union/405-744-5145
http://volunteer.okstate.edu/
Find volunteer opportunities and earn the recognition C.O.R.D. to wear at graduation.

University Dining Services
076 Student Union/405-744-4424
http://dining.okstate.edu/
For questions and comments about meal plans or university dining operations, contact University Dining Services.

ACADEMIC SUPPORT RESOURCES AND TUTORING

Learning and Student Success Opportunity (LASSO) Tutoring Center
021 Classroom Building/405-744-3309
https://lasso.okstate.edu/
LASSO offers free individual and group tutoring for a variety of courses.

STUDENT ACADEMIC SERVICES CENTERS

Agricultural Sciences & Natural Resources
136 Agricultural Hall/405-744-5395
Contact: Dr. Deb VanOverbeke
http://casnr.okstate.edu/students/ssc
Academic support and career guidance resources are available for CASNR students.

Counseling Psychology Clinic
107 Public Information Office/405-744-6980
https://education.okstate.edu/psych/clinic
Faculty and graduate students offer high quality and cost efficient psychological and mental health services to students Monday through Friday.
Arts & Sciences
213 Life Sciences East/405-744-5658
Contact: Dr. Amy Martindale
http://casstudents.okstate.edu/
Academic support and career guidance resources are available for Arts & Sciences students.

Education, Health & Aviation
106 Willard Hall/405-744-6350
Contact: Ms. Amy Gazaway
http://education.okstate.edu/watson
Academic support, advisement and career counseling is available to all education majors.

Engineering, Architecture & Technology
110 Engineering North/405-744-5276
Contact: Mr. Lance Millis
https://studentservices.okstate.edu/advising
Academic advising and career services are available for all CEAT students. Tutoring is offered for general math, science, and engineering courses.

Human Sciences
101 Human Sciences/405-744-2772
Contact: Ms. Kristi Seuhs
http://human sciences.okstate.edu/current-students
Academic support and career guidance resources are available for Human Sciences students.

Spears School of Business
155 Business Building/405-744-2772
Contact: Ms. Marissa McIntyre
http://spears.okstate.edu/ss/
Academic advisement is provided for freshmen through seniors in all business major areas.

University College Advising
214 Student Union/405-744-5333
Contact: Ms. Missy Wikle
https://uca.okstate.edu/
University College Advising has academic advisors to help with your academic needs, whether planning your semester schedule, teaching your First-Year Seminar class, looking at degree options, or helping to bridge the gap between student life and academic success. Call or visit the office anytime Monday through Friday, between 8:00 a.m. and 5:00 p.m.

DISCIPLINE SPECIFIC TUTORING

Academic Development Center
Kerr-Drummond Mezzanine/405-744-5905
http://reslife.okstate.edu/vac
Tutoring and supplemental instruction are available on select weekday, weekend, and evening hours.

Accounting
416 Business Building/405-744-2863
Walk-in tutoring is available for ACCT 2103, 2203, and 3103. See https://spears.okstate.edu/accounting/ acef for hours.

Biology & Zoology
303 Life Sciences West
http://biol1114.okstate.edu
Tutoring is provided for BIOL 1114.

Chemistry
453 Physical Science/405-744-9046
Tutoring for chemistry classes is available.

Civil & Environmental Engineering
315 Engineering South/405-744-9308
Tutoring for Statistics and Strength of Materials is available. Contact for more information.

Eta Kappa Nu Electrical and Computer Engineering Honor Society
010 Engineering South/405-744-4910
https://campuslink.okstate.edu/organization/eta-kappa-nu
Tutoring is provided by Eta Kappa Nu membership for Circuits, Network Analysis, and Electronic Devices.

The Language Lab
206 Gunderson Hall/405-744-9547
http://languages.okstate.edu
Two 28-user labs fully equipped with personal computers and listening/recording devices are available. Students may practice vocabulary building and grammar in the target language.

Graduate Research and Writing Lab
Contact: Victor D. Baeza/victor.baeza@okstate.edu/405-744-1241
http://info.library.okstate.edu/RLS/grads
Tutoring is available evenings from 5:00 p.m.-8:00 p.m. on Monday and Tuesday for current OSU graduate students.

History
101 S Murray Hall/405-744-5680
http://history.okstate.edu/contact
Tutoring is given for Survey of History and upper division courses.

Mathematics Learning Success Center
5th Floor Edmon Low Library/405-744-5818
http://www.math.okstate.edu/
Tutors are available to answer questions for classes ranging from Beginning Algebra through Calculus II. Tutoring for Differential Equations and Linear Algebra is offered at specific times.

Writing Outpost
102 Q, R, S Edmon Low/405-744-6671
http://osuwritingcenter.okstate.edu
30-minute walk-in consultations for writing projects are offered on a first come-first served basis on Monday-Thursday evenings 7:00 p.m.-10:00 p.m.

Writing Center
440 Student Union/405-744-6671
http://osuwritingcenter.okstate.edu
The Writing Center helps writers throughout the composing process; plan to visit early and often throughout the semester, not just the day before an assignment is due. Tutors work with students to improve brainstorming, organizational, and composing techniques.

Writing Center West
103 Ag Hall/405-744-6671
http://osuwritingcenter.okstate.edu
30-minute walk-in consultations for writing projects are available Monday-Friday from 11:30 a.m.-2:30 p.m.

FOR MORE INFORMATION

go.okstate.edu/apps
The OState app is your link to campus departments, OSU news, and maps. The Orange Shield app is the official safety app of OSU.

my.okstate.edu
This portal connects students to a wide range of campus services including links to student email, the library, and the Online Classroom and Community (D2L).

For other comments and inquiries, please contact academics@okstate.edu.