1. **ACTION DESIRED** (check one):
   - [ ] Trial Course
   - [X] New Course

2. **COURSE IDENTIFICATION**:
   - Dept: BIOL
   - Course #: F494
   - No. of Credits: 3

   Justify upper/lower division status & number of credits:

   This course will build on Bio1261 and expand on molecular biology themes. The level of understanding goes beyond simple factual knowledge and includes application of concepts. Bio342 is a recommended course prior to this course.

3. **PROPOSED COURSE TITLE**:
   - Principles of Virology

4. **CROSS LISTED?**
   - [ ] Yes, Dept:
   - [ ] No

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

5. **STACKED?**
   - [ ] Yes, Dept:
   - [ ] No

6. **FREQUENCY OF OFFERING**:
   - Alternate spring semester
   - (Every or Alternate) Fall, Spring, Summer - or As Demand Warrants

7. **SEMESTER & YEAR OF FIRST OFFERING** (if approved)
   - Spring 2009

8. **COURSE FORMAT**:
   - Lecture with an emphasis on active learning and student discussions
   - 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.

   - [ ] 1
   - [ ] 2
   - [ ] 3
   - [ ] 4
   - [X] 5
   - [ ] 6 weeks to full semester

9. **CONTACT HOURS PER WEEK**:
   - 3 LECTURE hours/week
   - LAB hours/week
   - 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](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):

    This course will cover the principles of virology. The main emphasis of this course is on the
biology of human and animal viruses. Plant viruses, however, will also be discussed in less detail. The course will focus on higher level of understanding of concepts governing the areas of virology covered in the course. Basic knowledge of cell biology is an absolute requirement of this course prior to enrolment. BIOL F261 or equivalent courses at other institutions are prerequisites for this course. Knowledge about the basic concepts covered in this prerequisite course will be assumed by the instructor. BIOL F342 is a recommended class to be taken prior to this course.

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 [ ] N = Natural Science [ ] S = Social Sciences [ ]

Will this course be used to fulfill a requirement for the baccalaureate core?

YES x 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 x 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?

T.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?

C. credits

13. GRADING SYSTEM:

LETTER: [ ] PASS/FAIL: [ ]

14. PREREQUISITES

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

BIOL F261

RECOMMENDED

BIOL F342

Classes, etc. that student is strongly encouraged to complete prior to this course.

15. SPECIAL RESTRICTIONS,

CONDITIONS

16. PROPOSED COURSE FEES

$0

Has a memo been submitted through your dean to the Provost & VCAS for fee approval? Yes/No

17. PREVIOUS HISTORY

Has the course been offered as special topics or trial course previously? Yes/No

If yes, give semester, year, course #, etc.

18. ESTIMATED IMPACT

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

None - this course is part of the faculty member's annual workload agreement

19. LIBRARY COLLECTIONS

Have you contacted the library collection development officer (ffklj@uaf.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and
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)

**Biology**

21. POSITIVE AND NEGATIVE IMPACTS

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

This course will broaden the opportunities for students in Biology to acquire understanding of an important area of biology that is currently not sufficiently covered

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.

Viruses cause a wide variety of diseases in humans, plants and animals. Currently no course in virology is offered in the biology program at UAF. Some topics in virology are covered briefly in Biol 342. A solid foundation in topics of virology will be helpful to students who continue their education in medical, dental or veterinary school as well as students that are interested in allied health field as well as graduate studies in basic biological areas. Participation in this course will make our graduates more competitive in these fields as well as making them more informed citizens in regard to this important field of studies.

APPROVALS:

<table>
<thead>
<tr>
<th>Signature, Chair, Program/Department of:</th>
<th>Biology and Wildlife</th>
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<td>Date</td>
<td>7/11/08</td>
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<th>Signature, Chair, College/School Curriculum Council for:</th>
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<th>Signature, Dean, College/School of:</th>
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Signature of Provost (if applicable)

Offerings above the level of approved programs must be approved in advance by the Provost.
Syllabus: Principles of Virology

1. Course Information:
   Title: Principles of Virology
   Number: F494
   Credits: 3
   Prerequisites: Biol 261
   Location: To be determined

2. Instructor contact information:
   Karsten Hueffer
   karsten.hueffer@uaf.edu
   Tel: 474 6313
   Office hour: flexible office hours by appointment
   E-mail is the best way to contact me.

3. Course readings/materials:
   The textbook for this course is:

   Readings from this text as well as additional reading materials will be assigned by the instructor.

4. Course Description:
   This course will cover the principles of virology. The main emphasis of this course is on the biology of human and animal viruses. Plant viruses, however will also be discussed in less detail. The course will focus on higher level of understanding of concepts governing the areas of virology covered in the course. Basic knowledge of cell biology is an absolute requirement of this course prior to enrolment. Biol 261 or equivalent courses at other institutions are prerequisites for this course. Knowledge about the basic concepts covered in this prerequisite course will be assumed by the instructor. Biol 342 is a recommended class to be taken prior to this course.

5. Course goals and outcomes:
   The student will be able to evaluate problems in modern Virology including areas of virus biology, pathogenesis, and disease control. Successful completion of the course will give a solid understanding of basic concepts in the field of Virology and enable the students to apply these concepts to problems in the field of virology. At the end of the course the student will be able to describe the basic steps in virus replication and disease. The student will be able to predict the outcome of intervention measures both on the cellular as well as the population level. For more detailed description of learning goals and objectives see bottom of Syllabus.

6. Instructional methods:
   The course is designed based on the scientific teaching method. This method includes active learning and group activities as well as formative assessments. The students are expected to read assigned material ahead of class so that class time can be spend on discussion of assigned reading, problem solving as well as other active learning activities. Assessment will be used throughout the course to help students judge their learning progress and help identify areas in need of focused attention.

7. Approximate schedule:
   Historic overview  week 1
   Methods in Virology  week 2
Virus Structure week 3
Virus Attachment and entry week 4
Genome replication (RNA viruses) week 5
Genome replication (DNA viruses) week 6
Viral Gene Expression week 7
Virus assembly week 8
Host defenses week 9
Patterns of infections week 10
Transformation and Oncogenesis week 11
Viral Pathogenesis week 12
Prevention and Control of Viral Diseases week 13
Virus Evolution and Emergence of New Viruses week 14

8 Course policies
You are expected participate in discussion and other active learning activities. You are also expected to arrive at lecture on time.

9 Requirements
All students will be required to do reading assignments. I encourage students to work on assignments together. The format of this assignment as well as the topic will be discussed with the instructor during the first three weeks of the semester and are due at the end of the semester

10 Evaluation/Grading

I will use plus minus grades in the class.

100%-97% A+
93%-96% A
89%-92% A-
85%-88% B+
81%-84% B
77%-80% B-
73%-76% C+
69%-72% C
65%-68% C-
61%-64% D+
57%-60% D
53%-56% D-
<53 F

Student performance will be evaluated with the following factors
Weekly quizzes 20% (end of each week)
Midterm oral exam 25% (end of week 7)
Final written exam 40% (at assigned during finals period)
Reading assessments 15% (beginning of each week)

-----------------------------------------
Total 100%
At the beginning of the week a short quiz will assess the knowledge of reading assignments to be completed prior to class. At the end of each week a short multiple-choice test will assess the knowledge of students about the topic discussed in class that week. The Midterm exam is an oral exam. The final is a written with multiple choice and small assay questions.

11 Support Services
If you require more assistance than can be provided in class, and office hours, you may want to contact Student Support Services (http://www.uaf.edu/sssp/).

12 Disability Services
If you have a disability, or think you may have a disability, please contact the Office of Disabilities Services (203 WHIT, 474-7043). We will work with this office to provide reasonable and appropriate accommodation to students with disabilities.
Learning Goals and Objectives

Overall Learning Goals:
Understanding of:
- general Virus life cycle
- fundamental differences between virus Groups
  - by genome composition
  - by structure
  - by genome size
  - by pathogenesis strategy
- Host-Virus interactions
- Methods and techniques used in virology

Overall Learning objectives:
Upon completion of the course the student will be able to:
- Describe general virus life cycle.
- Predict replication strategy of viruses based on genome composition
- Apply concepts of virus structure to replication cycle
- Evaluate different control measures of viral diseases
- compare possibilities and limits of methods and techniques used in virology
- Apply cell biological concepts to virological questions

Teachable units:

Historic overview:
Learning Goals:
Put milestones in Virology into context of engineering and general understanding of infectious disease over historical period.
Learning objectives:
List four milestones in virology
Describe development of virology as a science over time.
Connect the understanding of viruses to advances in engineering / technology

Methods in Virology:
Learning Goals:
Understand basic methods and techniques used in virology
Appreciate similarities and differences between diagnostic and research techniques
Learning objectives:
List basic techniques of cultivating viruses
Describe major diagnostic techniques in virology
Contrast the limitations of different methods
Propose a workflow to identify unknown viral agent

Virus Structure:
Learning Goals:
Understand components of virus particle
Understand concept of symmetry
Appreciate structural differences between enveloped and non-enveloped viruses
Learning objectives:
Describe basic components of virus particle
Explain the importance of symmetry in virus structures
Contrast structural elements of different viruses

Virus Attachment and entry:
Learning Goals:
Understand mechanism of viral attachment and entry
Understand differences based on viral structure
Learning objectives:
Describe three general mechanisms of viral entry
Predict the tissue tropism of viruses based on the receptor on the host cell
Contrast different trigger mechanism and their connection to entry mechanism
Evaluate the potential of entry inhibitor intivirals

Genome replication (RNA viruses):
Learning Goals:
Understand challenges faced by RNA viruses during their replication in the host cell
Understand fundamental differences between positive and negative strand RNA viruses
Learning objectives:
Name examples of RNA viruses
Explain different replication strategies for positive negative stand and retroviruses
Compare these replication strategies with genome replication strategy of host cells

Genome replication (DNA viruses):
Learning Goals:
Understand challenges faced by DNA viruses during their replication in the host cell
Learning objectives:
Name examples of DNA viruses
Describe replication strategies for DNA viruses
Compare these replication strategies with genome replication strategy of host cells
Predict differences between small and large genomes

Viral Gene Expression:
Learning Goals:
Understand how viruses subvert host cell gene expression mechanism
Appreciate differences between small and large viruses
Learning objectives:
Describe different mechanism of viral gene expression
Distinguish between acute and chronic viruses

Virus assembly:
Learning Goals:
Understand basic steps in virus assembly
Understand differences between DNA and RNA virus
Understand differences between enveloped and non enveloped viruses
Learning objectives:
Describe general methods of viral assembly
Compare differences in assembly based on life cycle strategy
Host defenses meet viral biology:
Learning Goals:
Understand interplay between viral life cycle and host defenses
Understand differences between acute and chronic viruses
Understand immune evasion strategies of differences between viruses
Learning objectives:
Describe basic components of the host immune system
Predict level of immune modulation based on viral replication strategies
Design potential immune evasion strategy for viruses

Patterns of infections:
Learning Goals:
Understand general course of infection
Appreciate the differences between acute and chronic infections
Understand importance of infection patterns on public health
Learning objectives:
Describe basic course of infection
Predict influence of infection pattern on disease prevention

Transformation and Oncogenesis:
Learning Goals:
Understand basic mechanism of oncogenes and viral transformation
Appreciate the importance of viruses in cancer
Learning objectives:
Describe mechanism of oncogenesis and viral transformation
Predict ability of viruses to cause tranformation

Viral Pathogenesis:
Learning Goals:
Putting Virus biology into organismal context
Understand the importance of different cellular factors in disease
Learning objectives:
Apply cellular concepts of virus biology to the organism level
Distinguish steps in viral pathogenesis

Prevention and Control of Viral Diseases:
Learning Goals:
Understand different control measures available to veterinary and human medicine
Understand the importance of vaccination for individual as well as public health
Learning objectives:
Describe different control measures including vaccination, quarantine and culling
Evaluate the risks and benefits of vaccination on a personal as well population level

Virus Evolution and Emergence of New Viruses:
Learning Goals:
Understand factors leading to virus emergence and new viruses
Appreciate the role of viral emergence on human affairs
Learning objectives:
Describe reasons for viral emergence
Predict the potential for virus evolution and emergence
Reading requirements:

The students are expected to read the assigned material **ahead** of class starting with the second week of class. The lecture time will not cover all material in the reading but will rather focus on areas not clear after reading the assigned material as well applications of the material covered in the reading.

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