LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
		04-139	Appr 10/26/04	Appr 12/7/04

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person	Email Address
Dr. Roberta Eddy	rmeddy@iup.edu
Proposing Department/Unit	Phone
SDR/Science for Disaster Response	724-357-4482

Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each program proposal.

1. Course Proposals (check all that apply)

__X__ New Course _____ Course Prefix Change _____ Course Deletion

_____ Course Revision _____ Course Number and/or Title Change _____ Catalog Description Change

	SDR 321 Organic Chemistry of WMD, TICs, and TIMs
***Current* Course prefix, number and full title**	***Proposed* course prefix, number and full title, if changing**

2. Additional Course Designations: check if appropriate

_____ This course is also proposed as a Liberal Studies Course.

_____ This course is also proposed as an Honors College Course.

_____ Other: (e.g., Women's Studies, Pan-African)

3. Program Proposals

_____ Catalog Description Change _____ Program Revision

_____ New Degree Program _____ Program Title Change _____ Other

_____ New Minor Program _____ New Track

***Current* program name**	***Proposed* program name, if changing**

4. Approvals		**Date**
Department Curriculum Committee Chair(s)	Wendy Lou Elcesser	4-06-04
Department Chair(s)	Lucas VanJassen Ramsey*	4-06-04
College Curriculum Committee Chair	Wendy Lou Elcesser	4-06-04
College Dean	John D. Eddy	8/19/04
Director of Liberal Studies *		
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)		
UWUCC Co-Chairs	Gail Sechrist	10-26-04

* where applicable

RECEIVED OCT 29 2004 LIBERAL STUDIES

RECEIVED OCT 14 2004 LIBERAL STUDIES

SYLLABUS OF RECORD

I. Catalog Description

SDR 321 Organic Chemistry of WMD, TICs, and TIMs — 3 class hours, 4 lab hours, 5 credit hours (3c-4l-5cr)

Prerequisites: SDR 221 and permission of instructor and local, state or federal agency/organization authorization.

Level 3 chemistry focuses on aldehydes, ketones, carboxylic acids, derivatives of carboxylic acids, and amines as they pertain to weapons of mass destruction. The nomenclature, preparations and reactions of these classes of organic compounds are presented. Additional topics include organophosphorous chemistry for the synthesis of nerve agents, precursors and hazards involved with the synthesis of drugs in clandestine laboratories, and the terminology of mass spectrometry. Practical exercises include basic wet chemistry techniques for identification of unknown aldehydes and ketones, basic separation techniques, and a synthetic technique that is similar to what is used in a clandestine drug lab.

II. Course Objectives

Students successfully completing this course will be able to

1. Name an organic compound when given the structure of the organic compound.
2. Assess the methods for preparing aldehydes and ketones.
3. Evaluate the reactions of carbonyl compounds and assess their use as lachrymators, chocking agents and riot control agents.
4. Characterize carboxylic acids.
5. Assess methods for preparing carboxylic acids and organic bases and determine their potential as weapons.

6. Assess the reactions of carboxylic acids, their use in preparing acid halides and the use of acid halides as weapons.
7. Assess the hazards associated with some derivatives of carboxylic acids.
8. Assess the hazards associated with amines and arylalkylamines.
9. Evaluate clandestine preparations of controlled substances.
10. Assess the use of enolate chemistry in clandestine drug laboratories.
11. Assess reactants and reactions involving phosphorus and the preparation of nerve agent precursors.
12. Summarize mass spectrometry using the correct terminology.

III. Course Outline

Lecture (42 hours total)

A. Chemical Communication (3 hours)
   1. Priority rules for the classes of organic compounds when naming organic compounds
   2. Formulas of functional groups
      i. acid halides
      ii. alcohols
      iii. aldehydes
      iv. amides
      v. carboxylates
      vi. carboxylic acids
      vii. ethers
      viii. esters
      ix. hydroperoxides
      x. ketones
      xi. sulfides
      xii. thiols
   3. Prefix names, suffix ring names, and usual suffix names
      i. acid halides
      ii. alcohols

iii. aldehydes
iv. amides
v. carboxylates
vi. carboxylic acids
vii. ethers, esters
viii. hydroperoxides
ix. ketones
x. sulfides
xi. thiols.

4. Nomenclature of aldehydes
5. Nomenclature of ketones
6. Nomenclature of ethers
7. Nomenclature of carboxylic acids
8. Nomenclature of acid halides
9. Nomenclature of acid anhydrides
10. Nomenclature of esters and salts of carboxylic acids
11. Nomenclature of amides
12. Nomenclature of amines
13. Nomenclature of sulfur compounds

B. Preparation of Aldehydes and Ketones (3 hours)
   1. Preparation of aldehydes and ketones
      i. Oxidation of an alcohol
      ii. Reaction of ozone with an alkene
      iii. Reaction of periodic acid with diols for the preparation of aldehydes, ketones, or carboxylic acids
      iv. Use of boranes and their potential as weapons
   2. Preparation of aldehydes
      i. Reduction of acid halides
      ii. Reduction of esters with dissolving metal hydrides
      iii. Reduction of nitriles
   3. Preparation of ketones from the oxidation of secondary alcohols and alkenes

C. Reactions of Carbonyl Compounds and Introduction to Selected, Powerful TICS (6 hours)
    1. Reactions of aldehydes and ketones with:
        i. Hydrogen cyanide to form cyanohydrins
        ii. Nitrogen nucleophiles
        iii. Grignard reagents and the use of Grignard reagents in the preparation of PCP and methamphetamine
        iv. Dithianes and their use as simulants
    2. The Wittig Reaction and possible use as a distracter for nerve agents
    3. Reduction of aldehydes and ketones
    4. Oxidation of aldehydes and ketones
    5. Wet chemistry reactions of aldehydes and ketones and the use of the Hazcat chemistry kit
D. Introduction to Potentially Deadly, Corrosive Carboxylic Acids and Dangerous Organic Bases (3 hours)
    1. Identification of a carboxylic acid and indication of the use of these compounds in chemical warfare
    2. Common names of selected carboxylic acids
    3. Factors that affect the acidity of carboxylic acids
    4. Factors that affect the acidity of dicarboxylic acids
    5. General trends for relating acidities
    6. Organic bases
E. Preparation of Carboxylic Acids – A Possible Entry for the Production of Powerful TICS and TIMS (3 hours)
    1. Oxidation of primary alcohols
    2. Oxidation of aldehydes
    3. Oxidation of carbon-carbon multiple bonds
    4. Oxidation of the side chain of aromatic compounds
    5. Oxidation of methyl ketones
    6. Use of organometallic reagents and how these compounds can be easily weaponized

7. Use of nitriles

F. Reactions of Carboxylic Acids and a Possible Route to a Lachrymator (3 hours)
   1. Carboxylic acids as "classic" acids
   2. Substitution reactions at the α carbon of carboxylic acids
   3. Nucleophilic acyl addition and elimination reactions of carboxylic acids
   4. One-carbon degradation reactions
   5. Acid-base reactions of carboxylic acids
   6. The Hell-Volhard-Zelensky reaction
   7. Reduction reactions of carboxylic acids
   8. Reactions involving the carbonyl carbon of carboxylic acids
   9. Decarboxylation of carboxylic acids

G. Derivatives of Carboxylic Acids – A prelude to G Agent and VX Synthesis (3 hours)
   1. Hazards associated with acid halides
   2. Hazards associated with esters
   3. Hazards associated with amides

H. Amines and Arylalkylamines (Drug Precursors) (5 hours)
   1. Classification of amines as primary, secondary, tertiary, or quaternary
   2. Selected illicit drugs as amines
   3. Procedure for obtaining an alkaloid from plant material
   4. Basicity of amines
   5. Hazards associated with low molecular weight amines
   6. The effect of substituents on the basicity of amines
   7. Preparation of aromatic amines
   8. Preparation of arylalkylamines

Exam 1 (1 hour)

I. Illicit Drugs and Precursors (6 hours)
   1. Classification of controlled substances as belonging to the amphetamine class or the ecstasy class
   2. Precursors for the amphetamine class of controlled substances

3. Hazards associated with the materials used to synthesize the amphetamine class of controlled substances
4. Precursors for the ecstasy class of controlled substances
5. Hazards associated with the materials used to synthesize the ecstasy class of controlled substances
6. Hazards associated with the materials used to synthesize phencyclidine (Angel Dust)

J. Phosphorous Chemistry and Chemical Warfare Nerve Agents (4 hours)
1. Nomenclature of phosphines
2. Characteristics of phosphines
3. The Wittig reaction
4. Phosphate and phosphate esters
5. Phosphonic acids
6. Preparation of dialkyl phosphonates
7. Preparation of monoalkyl phosphonates
8. Synthesis of nerve agents
9. Preparation of phosphine
10. Arsine
11. Method for the generation of phosgene

K. Instrument Terminology Associated with Detection of WMD Substances (2 hours)
1. Major parts of the mass spectrometer
2. Methods of sample introduction
3. Methods of disposing of the bulk of carrier gas
4. Vacuum pumps
5. Ion sources
6. Mass analyzers

Final Exam –(2 hours) During Final Exam Week or end of course depending on mode of delivery

Laboratory (56 hours total)

1. Introduction; Safety, and Check-In (4 hours)
2. Electrophilic Aromatic Substitution Reaction: Friedel-Crafts Acylation (4 hours)
3. The Oxidation of Isoeugenol to Form a Reagent Used in the Manufacture of Liqueurs (4 hours)
4. Identification of Unknown Aldehydes and Ketones (4 hours)
5. Haloform Preparation of a Carboxylic Acid (4 hours)
6. Separation of a Mixture through Acid-Base Reactions (4 hours)
7. Synthesis and Analysis of an Intermediate in the Manufacture of Fungicides: A Substitution Reaction of an Aryldiazonium Salt (8 hours)
8. Illicit Drug Lab – Synthetic Methodology (4 hours)
9. Synthesis of E-3 (3,4-methylenedioxyphenyl)propenoic Acid, a Clandestine Drug Precursor (8 hours)
10. Synthesis of an Analgesic and Comparison to the Commercial Product (8 hours)
11. Check-Out and Final Quiz (4)

IV. Evaluation Methods

The final grade will be determined by the following methods and percent weights:

Written Exams (50%)

There will be two exams in the course, a mid-term during the middle of the semester and a comprehensive final during the final exam week. Typical questions are scenario based and require students to predict the products of the reactions and the hazards associated with carbonyl compounds, amines, arylalkylamines, and phosphorus compounds under given conditions.

Laboratory Component (25%)

Students write laboratory reports, which include experimental observations, data analysis, calculations, and conclusions. Laboratory experiments focus on the preparations and

reactions of carbonyl compounds with an emphasis on the hazards. Additionally, there is a comprehensive final exam. Questions are based on the laboratory exercises.

Capstone Event (25%)

The capstone event is an equivalent of a term paper performed by the student outside of the regular class hours. The event is a simulation of a real-life incident involving WMD. Students will be evaluated on their ability to assess an "incident site" for possible unknown chemical hazards, predict the hazards associated with the unknown chemical(s), and conduct the proper response call. The students will apply prior training and education in response to chemical incidents. Each student will construct a portfolio that documents his or her response to the capstone event. The format for the portfolio report will be similar to the format used for real incident reports and training reports.

V. Grading Scale:

A: ≥90% B: 80-89% C: 70-79% D: 60-69% F: <60%

VI. Attendance Policy

Attendance in both lecture and laboratory is expected of all students in the class. The policy is governed by university rules and regulations. The students are strongly encouraged to attend all classes.

VII. Required Textbooks, Supplemental Books and Readings

Required Textbook:

Wood, J.T. and Eddy, R.M. *Weapons of Mass Destruction-Response Element Advanced Laboratory Integrated Training and Indoctrination (WMD-REALITI) Apprentice Level (Level 3) Chemistry Lesson Plans.* (Revised December 2003.)

Supplemental Books:

Volhart, K.P.C.; Schore, N.E. *Organic Chemistry: Structure and Function*, 4th ed.; W.H. Freeman and Company: New York, 2003.

VIII. Special Resource Requirements

Laboratory goggles.

VIII. Bibliography

Note: Some WMD references are not listed due to the sensitive nature of their content.

1. Awachie, P.I.; Agwada, V.C. "Evidence for Rate Limiting C-H Bond Cleavage in the Leuckart Reaction"; *Tetrahedron Lett.* **1990,** *45*, 1899-1910.

2. Brown, H.C.; Brown, C.A. "New, Highly Active Metal Catalysts for the Hydrolysis of Borohydride"; *J. Org. Chem.* **1962,** *84*, 1493-1494.

3. Bruckner, R. *Advanced Organic Chemistry: Reaction Mechanisms*; Harcourt/Academic Press: Burlington, MA, 2002.

4. Bryant, P.J.R.; Ford-Moore, A.H.; Perry, B.J.; Wardrop, A.W.H.; Watkins, T.F. "The Preparation and Physical Properties of Isopropyl Methylphosphonofluoridate (Sarin)"; *Journal of the Chemical Society, London.* **1960,** 1153-1555.

5. Carey, F.A.; Sundberg, R.J. *Advanced Organic Chemistry, Part A: Structure and Mechanisms*, 4th ed.; Kluwer Academic/Plenum Publishers: New York, 2000.

6. Carey, F.A.; Sundberg, R.J. *Advanced Organic Chemistry, Part B: Reactions and Synthesis*, 4th ed.; Kluwer Academic/Plenum Publishers: New York, 2000.

7. Crews, P.; Rodriguez, J.; Jaspars, M. *Organic Structural Analysis*; Oxford University Press: New York, 1998.

8. Farkas, E.; Sunman, C.J. "Chiral Synthesis of Doxpicomine"; *J. Org. Chem.* **1985,** *50*, 1110-1112.

9. Ford-Moore, A.H.; Perry, B.J. "Diisopropyl Methylphosphonate". In *Organic Synthesis*, Schreiber, R.S., Editor; John Wiley & Sons, Inc.: New York, 1951, pp. 33-35.

10. Fox, R.B.; Powell, W.H. *Nomenclature of Organic Compounds*, 2nd ed.; Oxford University Press, Inc.: New York, 2001.

11. Gringauz, A. *Introduction to Medicinal Chemistry: How Drugs Act and Why*; Wiley-VCH, Inc.: New York, 1997.

12. Harwood, L.M.; Claridge, T.D.W. *Introduction to Organic Spectroscopy*; Oxford University Press, 1997.

13. Hauser, C.R.; Hudson, B.E.,Jr. "The Acetoacetic Ester Condensation and Certain Related Reactions". In *Organic Reactions*, Vol. 1; Adams, R., Ed. in Chief; John Wiley & Sons, Inc.: New York, 1942.

14. Hesse, M.; Meier, H.; Zeen, B. *Spectroscopic Methods in Organic Chemistry*; Translated by A. Linden, M. Murry, and G. Thieme; Verlag Stuttgart: New York, 1997.

15. Kabala, G.W.; Guindi, L.H.M.; Varma, R.S. "Selected Reductions of Conjugated Nitroalkenes"; *Tetrahedron Lett.* **1990,** 7443-7457.

16. Kalir, A.; Edery, H.; Pelah, Z.; Balderman, D.; Porath, G. "1-Phenylcycloalkylamine Derivatives. II. Synthesis and Pharmacological Activity"; *J. Med. Chem.* **1969,** *12*, 473-477.

17. Kinnear, A.M.; Perren, E.A. "Formation of Organo-phosphorus Compounds by the Reaction of Alkyl Chlorides with Phosphorus Trichloride in the Presence of Aluminum Chloride"; *J. Am. Chem. Soc.* **1952,** 3437-3445.

18. Lambert, J.; Shurvell, H.; Lightner, J.; Cooks, R. *Organic Structural Spectroscopy*; Prentice Hall: Upper Saddle River, NJ, 1998.

19. Li, J.J. *Name Reactions: A Collection of Detailed Reaction Mechanisms*; Springer-Verlag: Berlin, 2002.

20. Maddox, V.H.; Godefroi, E.F.; Parcell, R.F. "The Synthesis of Phencyclidine and Other 1-Arylcyclohexylamines"; *J. Med. Chem.* **1965,** *8*, 230-235.

21. Maden, A.; Hayward, M. "Sheet Materials for Use as Membranes in Membrane Introduction Mass Spectrometry"; *Anal. Chem.* **1996,** *68*, 1805.

22. Matt, C.; Wagner, A.; Mioskowski, C. "Novel Transformation of Primary Nitroalkanes and Primary Alkyl Bromides to the Corresponding Carboxylic Acids"; *J. Org. Chem.* **1997,** *62*, 234-235.

23. *McGraw-Hill Dictionary of Chemical Terms*; Parker, S.P., Ed. in Chief; McGraw-Hill Book Company: New York, 1985.

24. McLafferty, F.; Turecek, F. *Interpretation of Mass Spectra*, 4th Edition, University Science Books: Mill Valley, CA, 1993.

25. Nimble, J.B. *The Construction and Operation of Clandestine Drug Laboratories*, 2nd ed.; Loompanics Unlimited: Port Townsend, WA, 1994.

26. Panico, R; Powell, W.H; Richer, J.C. *A Guide to IUPAC Nomenclature of Organic Compounds*; Blackwell Science, Inc.: Cambridge, MA, 1993.

27. Rogers, H.R.; McDermott, J.X.; Whitesides, G.M. "The Oxidation of Terminal Olefins to Methyl Ketones by Jones Reagent Is Catalyzed by Mercury (II)"; *J. Org. Chem.* **1975,** *40* (24), 3577-3580.

28. Saunders, B.C.; Stacey G.J. "Esters Containing Phosphorus. Part IV. Diisopropyl Fluorophosphonate"; *J. Chem. Soc., London.* **1948,** 695-699.

29. Savickas, P.; Lapack, M.; Tou, J. "Hollow Fiber Membrane Probes for the In Situ Mass Spectrometric Monitoring of Nitrogen Trichloride Formation during Wastewater Treatment"; *Anal. Chem.*, **1989,** *61*, 2332.

30. Silverstein, R.M.; Webster, F.X. *Spectrometric Identification of Organic Compounds*, Sixth Edition; John Wiley & Sons, Inc.: New York, 1998.

31. Smith, M.B. *Organic Synthesis*, 2nd. ed.; McGraw-Hill, Inc.: New York, 2002.

32. Smith, M.B.; March, J. *March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure*, 5th ed.; John Wiley & Sons, Inc.: New York, 2001.

33. Toy, A.D.F. *Phosphorus Chemistry in Everyday Living*; American Chemical Society: Washington, D.C., 1976.

34. Tsuji, J. "Synthetic Applications of the Palladium-Catalyzed Oxidation of Olefins to Ketones"; *Synthesis*, **1984,** 369-384.

35. Uncle Fester. *Secrets of Methamphetamine Manufacture: Including Recipes for MDA, Ecstasy and Other Psychedelic Amphetamines*, 5th ed.; Loompanics Unlimited: Port Townsend, WA, 1999.

36. Watson, J. *Introduction to Mass Spectrometry*, 3rd Edition; Lippincott-Raven: Philadelphia, 1997.

37. Wong, P.; Srinivasan, N.; Kasthurikrishnan, N.; Cooks, R. "On-Line Monitoring of the Photolysis of Benzyl Acetate and 3,5-Dimethoxybenzyl Acetate by Membrane Introduction Mass Spectrometry"; *J. Org. Chem.*, **1996,** *61*, 6627.

38. Xu, C.; Patrick, J.; Cooks, R. "Affinity Membrane Introduction Mass Spectrometry"; *Anal. Chem.*, **1995,** *67*, 724.

COURSE ANALYSIS QUESTIONNAIRE

A. Details of the Course

A1. How does this course fit into the programs of the department? For which students is the course designed (majors, students in other majors, liberal studies)? Explain why this content cannot be incorporated into an existing course.

This course is a required course for students in the BS in Natural Science/Science for Disaster Response Track. It is not intended to be a Liberal Studies course. This course is designed for first responders – the emergency personnel who respond to any suspected incident of a chemical, biological, radiological and/or nuclear nature. The content and the intense material coverage are too specific to counterterrorism and first responders to be incorporated into an existing course such as CHEM 232 Organic Chemistry II.

A2. Does this course require changes in the content of existing courses or requirements for a program? If catalog descriptions of other courses or department programs must be changed as a result of the adoption of this course, please submit as separate proposals all other changes in courses and/or program requirements.

This course does not require changes in any other course in the department. A new track (Science for Disaster Response) of the existing program of the BS in Natural Science will include this course among the required courses.

A3. Has this course ever been offered at IUP on a trial basis (e.g. as a special topic) If so, explain the details of the offering (semester/year and number of students).

A pilot of an 11-day WMD-REALITI Chemical, Biological, Radiological and Nuclear Apprentice Module was conducted for the National Guard and other first responders in the WMD community in August 2002. There were 22 students enrolled in this course. The course received outstanding evaluations from both students and the government personnel present. In fact, it is because of the reception that the pilot courses received

that IUP was approached and asked to design an entire degree program for first responders.

A4. Is this course to be a dual-level course? If so, please note that the graduate approval occurs after the undergraduate.

This course is not a dual level course.

A5. If this course may be taken for variable credit, what criteria will be used to relate the credits to the learning experience of each student? Who will make this determination and by what procedures?

This course is not to be taken for variable credit.

A6. Do other higher education institutions currently offer this course? If so, please list examples (institution, course title).

To the best of our knowledge, this course and its intended degree program are unique in the United States. This lack of specific scientific education for emergency first responders at an accredited institution was one of the primary motivating factors for the National Guard Bureau (NGB) to approach IUP to develop this course.

A7. Is the content, or are the skills, of the proposed course recommended or required by a professional society, accrediting authority, law or other external agency? If so, please provide documentation.

The course objectives have been specifically developed under consultation with the NGB, the WMD-CSTs, the Federal Emergency Management Agency (FEMA), the Department of Defense (DoD), the Combating Terrorism Technology Support Office (CTTSO), and the Technical Support Working Group (TSWG) to meet the following standards:

- The Army Chemical Agent Safety Program,(AR 385-61)
- Toxic Chemical Agent Safety Standards (DA Pam 385-61)
- Occupational Safety and Health Standards, Chapter 29-Code of Federal Regulations 1910.120(e)(8)

B. Interdisciplinary Implications

B1. Will this course be taught by instructors from more than one department or team taught within the department? If so, explain the teaching plan, its rationale, and how the team will adhere to the syllabus of record.

This course will be taught by one instructor or team taught by two instructors within the Chemistry Department. The instructor(s) must be associated with the WMD programs at IUP. Individual faculty workloads will likely dictate whether one or two instructors are assigned to the course. The course is a combination of lecture and laboratory.

B2. What is the relationship between the content of this course and the content of courses offered by other departments? Summarize your discussions (with other departments) concerning the proposed changes and indicate how any conflicts have been resolved. Please attach relevant memoranda from these departments that clarify their attitudes toward the proposed change(s).

The intended audience of SDR 321 (active first responders in the WMD community) may require intensive delivery and specific educational objectives that are not met by existing IUP courses.

B3. Will this course be cross-listed with other departments? If so, please summarize the department representatives' discussions concerning the course and indicate how consistency will be maintained across departments.

This course is not cross-listed.

B4. Will seats in this course be made available to students in the School of Continuing Education?

Only if the Continuing Education students have been accepted in the SDR program.

C. Implementation

C1. Are faculty resources adequate? If you are not requesting or have not been authorized to hire additional faculty, demonstrate how this course will fit into the schedule(s) of current faculty. What will be taught less frequently or in fewer sections to make this possible? Please specify how preparation and equated workload will be assigned for this course.

Yes, faculty resources are adequate because of external funding. If no external funding is available, then additional faculty resources will be required. This course will count as one preparation and seven (7) workload hours towards the workload for one faculty member, or as credits split appropriately among the workloads of each of two faculty members who team teach the course. Each contact hour in laboratories in chemistry, biology, and physics is assigned one (1) workload hour, so 3c + 4l = 7 workload hours.

The faculty credentials include possession of a Ph.D. in organic chemistry and a minimum of five years teaching experience, balanced with three to five years of professional work experience in the following areas, skill sets, and certificates. The qualified faculty member will have:

- Experience in general organic chemistry; environmental sample techniques; analytical techniques; spectroscopic methods of molecular structure determination using gas chromatography/mass spectrometry and infrared spectroscopy; recognition, evaluation, and management of nuclear, biological, and chemical weapons.

- A thorough understanding of laboratory safety procedures and national laboratory standards to meet chemical surety standards as delineated by respective government standard operating procedures (SOPs).

- A Chemical Hygiene Officer certificate issued by the National Registry in Clinical Chemistry to ensure competent, safe laboratory operations, appropriate decontamination protocols, and compliance with chemical surety SOPs.

C2. What other resources will be needed to teach this course and how adequate are the current resources? If not adequate, what plans exist for achieving adequacy? Reply in terms of the following:

*Space
*Equipment
*Laboratory Supplies and other Consumable Goods
*Library Materials
*Travel Funds

Space: Presently, this degree program is being conducted using the facilities in IUP's science building, Weyandt Hall. However, plans are underway to renovate the second floor of Walsh Hall for the WMD programs. This renovation is scheduled to begin at the end of the Spring 2004 semester. The WMD programs are under the umbrella of IUP's John P. Murtha Institute of Homeland Security. The WMD programs are designated to have space in this building when it is constructed.

Equipment: Specialized equipment, including the HAPSITE GC/MS and the TravelIR, has been provided by the DoD through the WMD-REALITI contracts. In the event that contract money is not available to purchase equipment, ESF funds will be used to purchase equipment, or the WMD faculty will write grant proposals for specialized equipment.

Laboratory Supplies: Laboratory supplies have been provided by the DoD through the WMD-REALITI contracts. In the event that contract money is not available to purchase laboratory supplies, funds from the WMD operating budget will be used to purchase the laboratory supplies. This money will be generated from the indirect funds acquired by contracted offerings of the WMD courses or by funds generated by student fees.

Library: When this course is funded by external money, Concurrent Technologies Corporation (CTC), will package the materials needed by the students. In the event that the course is not funded by external money, students will purchase the required text at a local copying business. Students may purchase the optional supplemental text at the Co-op Store or online.

Travel Funds: not applicable

C3. Are any of the resources for this course funded by a grant? If so, what provisions have been made to continue support for this course once the grant has expired? (Attach letters of support from Dean, Provost, etc.)

Yes. So far, all resources for this course have been funded by the DoD and the National Guard Bureau (NGB). Contracts with these agencies are expected to continue for several years. However, IUP is prepared to support this course through ESF funds and tuition if external funds are not available. Additionally, IUP has actively sought and acquired funds for a facility to house the WMD courses.

C4. How frequently do you expect this course to be offered? Is this course particularly designed for or restricted to certain seasonal semesters?

We expect this course to be offered every Fall depending on student demand and faculty availability.

C5. How many sections of this course do you anticipate offering in any single semester?

One section will be offered at a time.

C6. How many students do you plan to accommodate in a section of this course? What is the justification for this planned number of students?

A maximum of 24 students can be accommodated in this class in which students do a considerable amount of laboratory work which limits the enrollment.

C7. Does any professional society recommend enrollment limits or parameters for a course of this nature? If they do, please quote from the appropriate documents.

No professional society recommends enrollment limits or parameters for this course. However, the DoD recommends an Instructor to Student ratio of 1:15 and has set the parameters for this course.

C8. If this course is a distance education course, see the Implementation of Distance Education Agreement and the Undergraduate Distance Education Review Form in Appendix D and respond to the questions listed.

This course is not a distance education course.

D. Miscellaneous

Include any additional information valuable to those reviewing this new course proposal.

Justification for 3c, 4l, 5cr:

Typically in the College of Natural Sciences and Mathematics, 4 credits are assigned to a class with 3 hours of class and 3 or 4 hours of lab. That is, usually a lab is valued as 1 credit towards the total course credits. In this course, the lab is valued as 2 credits due to the special nature of the laboratory exercises, which are more intensive in content and require the students to work

with more dangerous and/or high-risk materials. Because very little trial and error can be tolerated, students must be better prepared for the laboratory exercises and perform at a higher level. The intensive content and levels of preparation and performance are unlike that for the laboratory exercises in 1 credit laboratory courses. The 5 credits for this course have been acknowledged and approved by the College of Natural Sciences and Mathematics. Please see Appendix A for letter from Ms. Ola Kaniasty, Assistant Dean of the College of Natural Sciences and Mathematics and Chair of the College Curriculum Committee.