

2006 NASA Space Radiation Summer School

Draft Schedule of Course Activities

Arrival and Orientation

Thursday, June 8

Morning, Medical Department:

8:30-11:00 Students arrival. Security and housing.

Afternoon, Medical Dept. Small Conference Room

13:00 Student orientation. General Tour

BNL Training Part 1, RHIC-AGS USER CENTER

14:00 Verification of Credentials and Training Status

15:30 Complete On-line course work at Users' Center and Medical (Rad. Worker I)

Friday, June 9

Morning, Medical Dept. Small Conference Room

8:30 Daily Announcements

BNL Training Part 2, CAD Snyder Room

9:00 NSRL Radiobiology User Training lecture and exam

Issue Film Badges

Iris Scans at AGS MCR

Afternoon, Medical Dept. Small Conference Room

13:00 Orientation to Medical Department and Labs

BLAF Animal Care Video

WEEKEND: study of materials in prep for Monday (physics-bio)

WEEK 1

Monday, June 12

Morning, Medical Dept. Small Conference Room

8:30 Welcome, Registration and Announcements **M. Vazquez, G. Nelson**

Lecture Series 1: Overview

8-9 Space Environment and Radiobiology Overview **G. Nelson**
9-10 Accelerator Experiment Design and Implementation **G. Nelson & M. Vazquez**
10-11 Brookhaven-Specific Issues and Logistics **M. Vazquez**
11-12 Designing your own NSRL experiments (Beam Time Request Assignment)

Afternoon, Medical Dept. Small Conference Room

13:00 Brookhaven Facilities Tour: NSRL-MCR-AGS-CAD

Lecture Series 1, continued: Overview

14-16 Cell Biology Fundamentals **M. Vazquez**
16-18 Physics Fundamentals **G. Nelson**

18:00 Reception for Course Participants (TBD Location)

Tuesday, June 13

Morning, Medical Dept. Small Conference Room

8:30 Daily Announcements

Lecture Series 2: Physics Introduction

9-10 Measurement of Radiation **Rusek (Confirmed)**

Lecture Series 3: Accelerators

10-11 Accelerators Made Simple **Rusek/Brown (Confirmed)**
11-12 Accelerator Operations **Brown (Confirmed)**

Afternoon, NSRL

High LET Laboratory I: Introduction to Target Area, Exposure Design and Dosimetry

14:00 Tour NSRL Beam line-Target Area **A. Rusek, M. Vazquez**
Target Area Entry Procedures
Introduction to Control Software
Beam Line Equipment Orientation
Parallel plate, thimble and segmented ion chambers, binary filters
and Phosphor Imaging Systems

Evening

Wednesday, June 14

Morning, Medical Dept. Small Conference Room

8:30 Daily Announcements

Lecture Series 4: Physics 1

9-10 Properties and Types of Ionizing Radiation
10-11 Interactions of Radiation with Condensed Matter
11-12 Track Structure

T. Borak (Confirmed)
T. Borak (Confirmed)
L. Braby (Confirmed)

Afternoon, Medical Dept. Small Conference Room

Lecture Series 5: Physics 2

13:14 Doses, Fluences and Dose Rates

L. Braby (Confirmed)

In-class exercises and general discussion

Evening

18:00 Informal reception with physics lecturers

Thursday, June 15

Morning, Medical Dept. Small Conference Room

8:30 Daily Announcements

Lecture Series 6: Space Radiation Environment and Shielding

9-10:30 Radiation Transport & Shielding
10:30-12 Modeling

C. Zeitlin (Confirmed)
C. Zeitlin (Confirmed)

Lunch Break

14-15 Space Radiation Environment - SPEs
15-16 Risk Analysis Synthesis

R. Turner (Confirmed)
F. Cucinotta (Confirmed)

Classroom Problem Set and General Discussion

16:00 Physics Experiment Design-Planning and Set-Up

Friday, June 16

Morning, Medical Dept. Small Conference Room

8:30 Daily Announcements

9:00 Physics Experiment Design-Planning and Set-Up

Saturday, June 17

Morning, Medical Dept. Small Conference Room

8:30 High LET Laboratory I: Physics at NSRL

A. Rusek, M. Vazquez &

Afternoon, Medical Dept. Small Conference Room

14:00 Run debriefing, lessons learned

**Laboratory Protocols and Planning for June 21
General Discussion**

WEEK 2

Monday, June 19

Morning, Medical Dept. Small Conference Room

8:30 Daily Announcements

Lecture Series 7: Radiation Chemistry

9-10 Radiochemistry of Water and Macromolecules

K. Held

10-11 DNA Damage and Measurement

B. Sutherland

Lunch Break

Lecture Series 8: Cellular Radiobiology 1

13-14 DNA Repair Mechanisms

B. Sutherland

14-15 Cell Cycle

K. Held

15-16 Apoptosis

C. Troy

Laboratory Protocols and Planning for June 21

Evening

Tuesday, June 20

Morning, Medical Dept. Small Conference Room

8:30 Daily Announcements

9-10 Chromosomal Aberrations

M. Durante

Lecture Series 9: Cellular Radiobiology II

10:11 Low Dose and Dose Rate Responses

E. Azzam

11-12 Bystander Effect

E. Azzam

Afternoon

14-15 Microenvironment

M. Barcellos-Hoff

15-16 Tissue Remodeling and Late Effects

J. Williams

16:00 Cell and Animal Experiment Planning and Set-Up

Evening.

Wednesday, June 21

Morning, Medical Dept. NSRSS Laboratories

8:00 Daily Announcements

High LET Laboratory II: Biology Cell Experiments

8:30 Logistics

Instructors / Physicist

Set-ups and Calibrations. Final Sample Preparation and Exposures

Afternoon,

13:00 Post-Irradiation Processing

Vazquez, Guida Nelson

16:30 Tear Down Logistics. Collect Dosimetry Data and images

Medical Dept. Small Conference Room

17:00 Post Run Discussion and Evaluation

Instructors

Evening: Argentinean Barbeque

Thursday, June 22

Morning, Medical Dept. Small Conference Room

8:00 Daily Announcements

High LET Laboratory III: Biology/Animal Experiments

8:30 Logistics

Instructors / Physicist

Set-ups and Calibrations. Final Sample Preparation and Exposures

9:00 Dosimetry Data Reduction

Instructors

12:00 NASA site visit

K. Lorini

Afternoon, Medical Dept. NSRSS Laboratories

High LET Laboratory IV: Biology

13:00 24 Hour Sample Processing

Instructors

Evening.

Friday, June 23

Morning, Medical Dept. Small Conference Room

8:30 Daily Announcements

High LET Laboratory IV: Biology

9:30 Data collection and reduction.

Instructors

Afternoon, Medical Dept. NSRSS Laboratories

High LET Laboratory IV continued: Biology

13:00 Data collection and reduction

Instructors

WEEK 3

Monday, June 26

Morning, Medical Dept. Small Conference Room

8:30 Daily Announcements

9-11 Mutation and Genomic Instability

A. Kronenberg

11:00 Data collection and reduction

Afternoon, Medical Dept. NSRSS Laboratories

13:00 Final data collection and reduction

Tuesday, June 27

Morning, Medical Dept. Small Conference Room

8:30 Daily Announcements.

Deadline for student's beam time proposals

Lecture Series 11: Radiation Carcinogenesis

9-10 Cell Neoplastic Transformation

T. Hei

10-11 Leukemogenesis

M. Weil

Afternoon, Medical Department

Lecture Series 12: Nervous System Effects

13-14 Responses of Neural Cells

14-15 Responses of Brain

15-16 Behavioral Responses

J. Fike

M. Vazquez

B. Rabin

General Discussion

Wednesday, June 28

8:30 Daily Announcements

Series 13: Tissue Responses

9-10 Cataractogenesis

10-11 Cardiovascular

11-12 Immune System

N. Kleiman

D. Berkowitz

M. Pecaut

Series 14: Countermeasures

13-14 Medical Countermeasures

A. Kennedy

14-16 Physics Debriefing-student presentations

Thursday, June 29

Morning, Medical Dept. Small Conference Room

8:30 Daily Announcements

Lecture Series 15: NASA Program and Risk Assessment

9-10 Human space flight history

10-11 Shielding Design and Strategies

11-12 NASA NEW VISION for Exploration

J. Clark

M. Shavers

F. Sulzman

General Discussion

Afternoon, Medical Dept.

13:00 Student Presentations of Final Experimental Results

15-16 Solid Cancers

L. Hlatky

Social Event: Banquet

19 :00 Dinner Talk: Humans in Space

J. Clark

Friday, June 30

Morning, Medical Dept. Small Conference Room

8:30 Daily Announcements

9-11 Review of Beam Time Proposals

Issue Certificate of Completion

Afternoon, Medical Dept. NSRSS Laboratories

Summer Course Ends