

SCHEDULE

ADVANCED ASTRONOMY CAMP

Julian Dates 24535456.41 to 2453553.25
(June 24 - July 2, 2005)

Commemorating the 100th year of Einstein's Most Creative Year:
"We cannot solve problems with the same level of thinking we used when we created them."
Albert Einstein

JUNE 24 (Friday)

Sidereal time at midnight: 17:50:32

**"Imagination is more important than knowledge."
(Einstein)**

3 PM	Welcoming & introductions (UA Foundation Bldg. 205) look at your notebook; take the fun science "quiz"
3:30	<i>"Mt. Lemmon: A Sky Island"</i> (Don)
4	Drive to Mt. Lemmon
5:30	Move into dorm rooms dress warmly for the night
6:30	Cookout at summit video segment: <i>"Cosmic Voyage"</i>
7:32	Watch sunset outside 60" telescope twilight, Earth's shadow, satellites, stars, meteors, Milky Way
8	Drive to 61" telescope at Mt. Bigelow
8:30	Night sky orientation & fun observing: safety orientation dark adaption to <i>"Music of the Night"</i> nighttime assignment: UT, RA, DEC, LST, HA
8:56	Iridium satellite flash (V=-2; 78 deg. azimuth, 49 deg. altitude)
9:12	End of astronomical twilight
10:25	Moonrise
12:00 AM	Snack
12	Great Red Spot transits on Jupiter
1	Sleep
3:40	Start of astronomical twilight

JUNE 25 (Saturday)

Sidereal time at midnight: 17:54:29

**"Anyone who has never made a mistake has never tried anything new."
(Einstein)**

- 5:20 AM Sunrise
9 Wakeup; breakfast in Army tower
9:30 Meet for the day's overview (gym)
introduction to the Camp leaders
"How Fermi Would Have Fixed It" (Don)
nighttime observing projects (TAC Chairman: Susan)
SMT Research Projects (Teresa & Craig)
Cataclysmic Variable Stars (AJ)
non-observing projects (Don)
10:15 **"The Camp Computer Network & Rules"** (Sarah)
10:30 **"The Electromagnetic Spectrum"** (everyone)
11 **"Light and Telescopes"**
rotate between 5 different hands-on activities (15 minutes each):
reflection/telescopes (Tim & Yvette)
refraction/telescopes (Sarah & Caitlin)
inverse-square 'law' (Susan & AJ)
light sources (Craig)
interference (Don & Teresa)
12:45 PM Lunch
1:30 **"A Crash Course in Radio Astronomy"** (Craig)
2:30 **"The Solar System is Sooo Large"** (everyone)
outdoor hiking & parallax measuring activity
visit telescopes at the summit
plan for evening observing
4 Free time
dress for a long, cold night of observing
5 **"A Study of Binary Kuiper Belt Objects"** (Susan)
6 Dinner
video: **"Science & Space"**
President Kennedy's speech at Rice University (1962)
7:32 Watch sunset at the 60" telescope
prepare telescopes & instruments for observing
dark adaption to **"Planet X"**
8 Great Red Spot transits on Jupiter
8:15 AN **"ENGINEERING NIGHT"**:
Each team to experience astrometry, imaging, photometry, spectroscopy
for their moving object

Parallel activities: (research teams rotate between stations every 2 hrs):

understand: safety aspects and care of equipment
RA, DEC, sidereal time, hour angle
measure: field-of-view, angular scales at main focus and
finders, seeing, tracking/pointing accuracies,
NESW orientations, limiting magnitudes

Mt. Lemmon:

60" Telescope (CCD imaging) (Don & Caitlin)
test field: magnitude limit, signal-to-noise ratio
validating moving objects & NEO's

40" Telescope (photometry) (AJ & Yvette)
absolute photometry, variable stars, magnitudes

10" Telescope (eyepiece) (Tim & Don)
star hopping

12" Telescope (CCD color imaging) (Sarah & Teresa)
guide stars and autoguiding
plate scale, relative photometry

12" Telescope (convert to CCD spectroscopy sometime) (Don)

8:47 Io shadow starts to cross Jupiter
9:12 End of astronomical twilight
11:04 Moonrise
1 AM Midnight snack
1:30 Drive to Mt. Bigelow
2 61" Kuiper Telescope (CCD spectroscopy)
dispersion, spectral coverage, resolution
stellar spectral types

Other opportunities:
Visit Schmidt telescope searching for NEOs
laser experiment between mountains
eyeball spectroscopy with 10" telescope

3:30 Drive back to summit
3:41 Start of astronomical twilight
4:05 Orbital pass of Hubble Space Telescope (V=2.6; 30 deg. max alt.; SW-> SE)
4:12 Iridium satellite flash (V=-6; 94 deg. azimuth, 17 deg. altitude)
4:15 Sleep

JUNE 26 (Sunday)

Sidereal time at midnight: 17:58:26

"The important thing is not to stop questioning. Curiosity has its own reason for existing." (Einstein)

5:20 AM	Sunrise	
12 PM	Wakeup; brunch in the Army tower	
1	Review of the day's schedule	
	prepare observing proposals:	
	share initial ideas & compare notes	
	ask for help, advice, & ideas!!	
	sign up for the optional projects	
2:45	Submit telescope proposals	
2:45	Telescope Allocation Committee (TAC) convenes	
4	<i>"Infrared Astronomy: Principles & Tricks of the Trade"</i>	(Don)
5:30	TAC presents observing schedule	(Susan)
6	Dinner	
	video: <i>"Simspon's Astronomy Episodes"</i>	
	dress & prepare for a long night of observing	
7:32	Watch sunset at the 60" telescope:	
	prepare telescopes & instruments for observing	
	dark adaption to <i>"Galaxy Song"</i>	
8	Begin astronomy research projects at Mt. Lemmon & Mt. Bigelow	
9:12	End of astronomical twilight	
11:34	Moonrise	
12 AM	Midnight snack	
1:40	Great Red Spot transits on Jupiter	
3:41	Start of astronomical twilight	
4:05	Orbital pass of Hubble Space Telescope (V=2.9; 23 deg. max alt.; SW-> SE)	
4:06	Iridium satellite flash (V=-3; 96 deg. azimuth, 17 deg. altitude)	
4:15	Sleep	

JUNE 27 (Monday)

Sidereal time at midnight: 18:02:22

"Not everything that counts can be counted, and not everything that can be counted counts." (Einstein)

5:20 AM	Sunrise	
12 PM	Wakeup; brunch in Minnesota lounge	
1	Review of last night and plans for today	(Don)
1:30	Solar Observing with musical selections (sample three stations):	
	outside the 40":	
	image the Sun in continuum light	(AJ)
	Astroscan, TLRBSE solar telescope	
	outside the 60":	
	measure the Sun's luminosity	(Tim & Craig)
	SunGun & Questar	(Sarah)
	real-time Sun on the Internet	
	at the 12":	
	image the Sun in hydrogen-alpha light	(Teresa & Caitlin)
	radio interference & ionsphere	(Yvette - pending)
3:30	Work on projects:	
	image processing of nighttime data	
	planning for SMT Observing Project	
1:15	"The Foundations of Modern Cosmology"	(Don)
6	Dinner	
	video: "Wide Eyes" (about the University's Mirror Lab)	
7	Prepare for nighttime observing	
	dress for a long night of observing	
7:32	Watch sunset at the 60" telescope	
	prepare telescopes & instruments for observing	
	dark adaption to "Somewhere Out There"	
8	Begin astronomy research projects at Mt. Lemmon & Mt. Bigelow	
9:12	End of astronomical twilight	
9:40	Great Red Spot transits on Jupiter	
12:00 AM	Snack	
0:07	Moonrise	
2	Sleep	
3:41	Start of astronomical twilight	

JUNE 28 (Tuesday)

Sidereal time at midnight: 18:06:19

**"The most beautiful thing we can experience is the mysterious."
(Einstein)**

5:21 AM	Sunrise	
10	Wakeup; brunch in Minnesota lounge	
11:30	Drive to Mt. Graham International Observatory	
3:30 PM	Brief stop at Mt. Graham base camp get radios and permits	
5	Arrive at Large Binocular Telescope (LBT) dress & prepare for nighttime observing	
6	Drive to Hospital Flats	
7:30	Dinner around campfire	
7:33	Sunset	
8	Nighttime projects dark adaption to " <i>Starry Starry Night</i> " stargazing by naked eye and portable telescopes a mini "Messier marathon"	(AJ)
	SMT Observing	(Teresa, Craig)
9:12	End of astronomical twilight	
9:24	Orbital pass of Intl. Space Station (V=0.1; 50 deg. max alt.; WSW-> NE)	
11	Drive back to LBT	
12	Sleep	
0:36	Moonrise	
3:42	Start of astronomical twilight	

JUNE 29 (Wednesday)

Sidereal time at midnight: 18:10:15

**"The whole of science is nothing more than a refinement of everyday thinking."
(Einstein)**

5:21 AM Sunrise
8 Wakeup & breakfast
9 Tour the Large Binocular Telescope (LBT)
12 PM Lunch in the LBT
1 Travel to Mt. Lemmon
5 Arrive at the summit
dress for the evening
6:30 Dinner
7:33 Watch sunset at the 60" telescope
prepare telescopes & instruments for observing
dark adaption to "**Way Up There**"
8 Begin astronomy research projects at Mt. Lemmon & Mt. Bigelow
8:36 Iridium satellite flash (V=-1; 82 deg. azimuth, 59 deg. altitude)
9:12 End of astronomical twilight
9:14 Orbital pass of Hubble Space Telescope (V=3.7; 15 deg. max altitude; SSW)
9:43 Orbital pass of Intl. Space Station (V=2.3; 18 deg. max altitude; W -> N)
10 Astronomy research projects at Mt. Lemmon & Mt. Bigelow
11:20 Great Red Spot transits on Jupiter
12 AM Midnight snack
1:05 Moonrise
3:42 Start of astronomical twilight
3:57 Iridium satellite flash (V=-6; 102 deg. azimuth, 20 deg. altitude)
4:09 Orbital pass of Intl. Space Station (V=0.9; 37 deg. max altitude; NNW -> ESE)
4:15 Sleep

JUNE 30 (Thursday)

Sidereal time at midnight: 18:14:12

**"Everything should be made as simple as possible, but not simpler."
(Einstein)**

5:21 AM Sunrise
12 PM Wakeup; brunch in Minnesota lounge
1 Meet in the gym for the day's overview (Don)
review of the previous night and today's plans
1:30 "**The Origin of Water on Earth & Mars**" (Humberto Campins)
2:30 Work on projects:
image processing of nighttime data

6 Dinner
 make Saturnian ice cream
 7:15 Great Red Spot transits on Jupiter
 7:33 Watch sunset at the 60" telescope
 prepare telescopes & instruments for observing
 dark adaption to "*Variatons on a Theme*"
 8 Begin astronomy research projects at Mt. Lemmon & Mt. Bigelow
 8:29 Iridium satellite flash (V=-5; 84 deg. azimuth, 59 deg. altitude)
 8:33 Orbital pass of Intl. Space Station (V=-0.2; 58 deg. max altitude; SW -> NE)
 9:12 End of astronomical twilight
 9:12 Orbital pass of Hubble Space Telescope (V=3.0; 24 deg. max altitude; SW-> S)
 12 AM Midnight snack
 1:36 Moonrise
 3:00 Orbital pass of Intl. Space Station (V=2.8; 13 deg. max altitude; N -> ENE)
 4:34 Orbital pass of Intl. Space Station (V=-0.5; 41 deg. max altitude; WNW -> SSE)
 3:43 Start of astronomical twilight
 3:51 Iridium satellite flash (V=-4; 104 deg. azimuth, 19 deg. altitude)
 4 Sleep
 5:20 AM Sunrise

JULY 1 (Friday)

Sidereal time at midnight: 18:18:08

"Any intelligent fool can make things bigger, more complex, and more violent. It takes a touch of genius -- and a lot of courage -- to move in the opposite direction." (Einstein)

5:22 AM Sunrise
 12 PM Wakeup; brunch in Minnesota lounge
 1:15 Finalize research projects:
 show Don your airline ticket
 scholarship students write 'thank-you' letters
 4 **PROJECT & RESEARCH REPORTS**
 6 Dinner
 7:33 Watch sunset near Minnesota building
 8 Optional seminar: "*Astronomy as a Career*" (everyone)
 high school & undergraduate research opportunities
 8:59 Orbital pass of Intl. Space Station (V=2.6; 16 deg. max altitude; WNW -> N)
 9:11 Orbital pass of Hubble Space Telescope (V=2.4; 33 deg. max alt.; SW->S)
 9:12 End of astronomical twilight
 9:15 **EVERYONE pack luggage and CLEAN your rooms!!**
 counselor meeting
 2:10 Moonrise
 3:24 Orbital pass of Intl. Space Station (V=0.5; 41 deg. max altitude; NNW -> ESE)
 3:43 Start of astronomical twilight

JULY 2 (Saturday)

Sidereal time at midnight: 18:22:05

**"I have no special talents. I am only passionately curious."
(Einstein)**

5:22 AM	Sunrise	
7:00	Wakeup; breakfast in dorms	
	FINISH CLEANING & PACKING EVERYTHING!!!	
	You must have a counselor check your room before leaving.	
9:00	<u>MUST</u> travel to Tucson	
11**	Graduation ceremony	(Alumni Bldg. 205)
12 PM	Lunch	
	you pay!	
12:30	Leave for homes	