大学英语选修课系列教材

陈仲利　总主编

Understanding English for Science and Technology

周一兵　稽纬武◎主编

科技英语阅读教程

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■ **主编** 周一兵 嵇纬武
■ **编者** （按姓氏笔画排序）
王冬辉 王立松 肖振凤
邹葳 宋洁 周一兵
殷鸣

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“大学英语选修课系列教材”编委会

总 序

教育部颁布的《大学英语课程教学要求》对我国大学生英语的听、说、读、写、译等能力均提出了三个层次的要求，并在全国兴起了实用性大学英语教学改革与实践的浪潮。为进一步完善大学英语教学改革的成果，努力提高学生的英语实用能力，南开大学、天津大学、北京化工大学、北京航空航天大学、北京科技大学、北京邮电大学、对外经济贸易大学、广东工业大学、哈尔滨商业大学等国内重点高校的英语教师通力合作，编写了“大学英语选修课系列教材”。本套教材包括《高级英语口语教程》、《科技英语阅读教程》、《高级英语阅读教程》、《实用翻译技能集成》、《英美报刊深度阅读》、《高级英语写作教程》、《实用商务英语综合教程》、《英语视听说教程》和《当代英美社会文化新编》等九本教材。本系列教材应用了最新的英语教学理念，吸收了最新的英语教学成果，符合我国大学英语教学改革的最新要求，并体现了四、六级考试改革后的新精神，所有编写内容均为各参编院校多年使用过的优秀素材，具有良好的教学效果和广泛的使用基础。

“大学英语选修课系列教材”主要特点如下：

1．选材广泛，内容丰富。本系列教材所选材料均来自国内外原版报纸、杂志、教材、论著、会议论文、实用文件和一些权威网站，语言真实准确、地道优美；内容涉及视听说、口语、阅读、翻译、写作、文化、商务和科技英语等多个领域，适合不同专业学生对英语学习的需求。本系列教材选材注重原汁原味，力图使学生在浩瀚的知识海洋中多方汲取营养，以满足实用性英语教学的需求。如《高级英语阅读教程》的文章大多是近年来有关社会热点问题，并且大都是学生所关心和感兴趣的新闻报道，趣味性、实效性较强；另外，文章内容涉及生活的方方面面，集知识性、科普性、娱乐性于一体，有利于培养学生的学习兴趣。

2．注重语言综合技能的训练，实用性较强。通过精心选编的课文和悉心设计的多种实践和交际活动，从多渠道、多层面、多角度向学生输入大量有效语言信息，吸引学生参加多种多样、生动活泼的语言实践和交际活动，进行大量的“交互式”的语言输入（input）和输出（output）。如《英语视听说教程》、《高级英语口语教程》强调各种微技能的培养和训练，结合具体生活环境和主题，突出听说实践能力的培养；《实用翻译技能集成》围绕实例，阐明方法和技巧，强调翻译实践，培养动手能力。每一章围绕各种翻译技巧，梳理分析，深入浅出，将翻译理论技能和实践训练有机地结合起来。

3．编写严谨，精细实用。本系列教材均按照由浅入深、循序渐进的原则系统而连贯

地编写完成。《实用商务英语综合教程》、《科技英语阅读教程》各自在内容上互相渗透，融会贯通，有机地成为一体。同时，每册又各具特色，风格迥异。

4．知识全面，题型多样。为适应改革后的四、六级考试新模式，《高级英语写作教程》一方面向学生们介绍了各类议论、说明、记叙文体；另一方面，又详细阐明了各类应用文体，从而有效地提高了学生的英语写作实践能力。另外，《高级英语阅读教程》中增加了选词填空题、快速阅读、补全句子、简答等新题型。

5．本系列教材在传播语言知识的同时，更注重英美语言文化知识的学习。《英美报刊深度阅读》和《当代英美社会文化新编》系统介绍了英美报刊文学的特点和社会文化概况，使学生更加深入地了解英美社会面貌，激发英语学习兴趣，并大幅度提高自身的跨文化交际能力。

6．本系列教材综合了国内外同类教材的优点，兼顾了不同层次学生的需求，既体现了教育部有关大学英语教学改革的新精神，又满足了实用性英语教学的客观需要。同时，这些编者都是富有教学经验的一线教师，本系列教材是他们多年教学成果的结晶。

7．本系列教材适用范围广泛。不仅是大学本科生高级英语选修教材，亦可作为广大同学备考英语六级和报考研究生的参考用书，同时，也是英语专业学生或广大英语爱好者提高英语水平的良师益友。

总主编　陈仲利

2009年2月

前言

随着知识经济和全球化时代的到来，科技英语在提高学生科技创新能力以及国际科技合作与交流中发挥着越来越重要的作用。进一步加强当代大学生科技英语阅读能力，是我国高校适应创新型国家建设需求、培养创新型人才的重要内容。为了推动新世纪大学英语教学改革，提高本科生面向科技创新的后期大学英语学习能力，我们精心设计并编写了《科技英语阅读教程》一书。

本书选材以科学普及方面的文章为主，全书共分为16个单元，每个单元包含两个内容相近的篇章，每个篇章后设计有生词、短语、注释以及与课文相关的练习等，并在全书的最后提供了所有练习的参考答案，以方便学习者使用。

本书根据教育部2007年新颁布的《大学英语课程教学要求》以及1998年颁布的《大学英语教学大纲词汇表》确定了全书的词汇量为4 500词。生词的注解主要以四级以上的词汇为主，但对个别词义相对少见的四级词汇也增加了注解；在短语方面，本书主要选取大学英语四级学习阶段常见的条目。

为拓展学生的科技和人文素养，本书的课文注释主要从人文和科技知识的角度，加以解释说明。为提高学生的语言运用能力，在练习的设计上，除阅读理解题之外，本书还基于课文中一些地道的表达方式设计了翻译练习，目的是让学习者熟悉英语的表达习惯，进而提高自己的英语水平。

本书编写的具体分工如下：周一兵、嵇纬武负责书稿的整体构思、策划、修改、补充，审校全部稿件并最终定稿。王冬辉编写第四单元和第十二单元；王立松编写第十三单元和第十四单元；宋洁编写第八单元和第九单元；肖振凤编写第一单元、第二单元、第三单元和第十五单元；邹葳编写第七单元、第十一单元和第十二单元；周一兵编写第十六单元；殷鸣编写第五单元和第六单元。

本书初稿完成后，我校外籍教师对全书的英文内容进行了审阅，并提出了很多宝贵意见，谨在此表示衷心的感谢。本书的编写也得到了天津大学文法学院大学英语教学部全体教师的鼎力支持，在此深致谢意。在编写过程中，本书还参考了国内外一些相关书籍、杂志和网站的资料，特在此一并致以诚挚的谢意。

编　者

2009年1月

目 录

Unit One

Passage A

Can We Survive on the Moon?

When Neil Armstrong[1] took "one giant leap for mankind" onto the surface of the moon in 1969, his **booted** foot sank into a layer of fine gray dust, leaving an **imprint** that would become the subject of one of the most famous photographs in history. Scientists called the dust **lunar regolith**. Back then scientists regarded the regolith as simply part of the landscape, little more than the **backdrop** for the planting of the American flag.

No more. Lunar scientists have learned a lot about the moon since then. They've found that one of the biggest challenges to lunar settlement — as **vexing** as new **rocketry** or radiation — is how to live with regolith that covers **virtually** the entire lunar surface from a depth of 7 feet to perhaps 100 feet or more. It includes everything from huge **boulders** to particles only a few **nanometers** in **diameter**, but most of it is a **puree** created by uncountable high-speed **micrometeorites** that have been crashing into the moon **unimpeded** by atmosphere for more than 3 billion years. A handful of regolith consists of bits of stone, minerals, particles of glass created by the heat from the tiny impacts, and **accretions** of glass, minerals, and stone welded together.

Eons of melting, cooling, and **agglomerating** have transformed the glass particles in the regolith into a **jagged**-edged, **abrasive** powder that clings to anything it touches and packs together so densely that it becomes extremely hard to work on at any depth below four inches.

For those who would explore the moon — whether to train for exploring **Mars**, to mine resources, or to install high-precision observatories — regolith is a potentially **crippling liability**, an all-**pervasive**, **pernicious** threat to machinery and human tissue. After just three days of moonwalks, regolith threatened to **grind** the joints of the Apollo[2] astronauts' space suits to a halt. Special sample cases built to hold the Apollo moon rocks lost their vacuum seals because of **rims** corrupted by dust. For a permanent lunar base, such mechanical failures could spell disaster.

Regolith can play **havoc** with **hydraulics**, freeze on-off switches, and turn ball **bearings** into Grape Nuts[3]. When moon dust is disturbed, small particles float about, land, and glue themselves to everything. Regolith does not brush off easily, and breathing it can cause **pulmonary fibrosis**, the lunar equivalent of black lung. There is nothing like it on Earth. But space planners also see a brighter side to the story. Forty-two percent of regolith is oxygen by weight. **Extract** that and it will help make breathable air, rocket fuel, and, when mixed with hydrogen, water. Heat up regolith and it will harden into pavement, bricks, **ceramic**, or even solar panels to provide electricity. **Cloak** a living area in a thick enough blanket of it and it will enable astronauts to live radiation-free. If regolith is the curse of lunar exploration, it may also prove to be a blessing.

These issues lay **dormant** for three decades until January 2004, when President Bush announced his "Vision for Space Exploration[4]" and gave NASA[5] a new **mandate**: Return humans to the moon by 2020 and eventually send them on to Mars. Scientists are now thinking about what is needed to make the vision a reality. While there is debate about the political will to sustain lunar exploration, the technical **hurdles** are beyond dispute. The next person to step on the moon again will be taking humanity where it has never gone before, because that person will be settling in to stay — and that will be extremely hard to do.

NASA's current plans call for a series of "**precursor**" robotic lunar missions to test technologies and gather information. These will begin next year, long before NASA's new **Orion** Spaceship[6] is ready to **loft** its four-astronaut crew moonward. By the time that happens, perhaps around 2018, planners hope to have resolved some key unknowns: whether there are ice deposits at one of the lunar poles, whether a space suit can be made that can survive multiple journeys across the **dust-ridden** landscape, and whether the human body can survive dust, lengthy stays in reduced gravity, and **prolonged** exposure to **cosmic** radiation.

The first trips will be Apollo-like **sorties**, brief visits to test techniques and equipment and to begin building the outpost. **Eventually** the base will include living quarters, a launch-pad, a storage facility for fuel and supplies, and a power plant. By 2024, NASA experts expect to have enough **infrastructure** to support a permanent human presence with four astronauts rotating every six months, the same length of a stay as on the International Space Station[7].

Setting up a permanent outpost on the moon would, in many respects, be more **daunting** than putting an outpost on Mars. Like Earth, Mars has an atmosphere, weather, and seasons, and its gravity is one-third of Earth's. The moon has one-sixth of Earth's gravity, no atmosphere, and a merciless and unending **barrage** of radiation and micrometeorites. Some scientists argue that if going to Mars is the ultimate goal, there's no point in going to the moon.

But if the goal is learning about long-term stays in space, going to the moon provides excellent instruction. Space station astronauts are in low Earth orbit, only 224 miles from safety. Moon astronauts will be three days from help, and Mars astronauts will, at best, be months away — virtually alone after liftoff. The explorers will not only have to learn to live in reduced gravity in **cramped** spaces for prolonged periods, as in the carefully **calibrated** indoor environment of the space station, but they must also work outside for extended periods in potentially **lethal** environments they cannot control. They must make **consumables** like oxygen, recycle them, and recycle waste. They must be able to maintain their equipment, knowing that not only their scientific mission but their very lives may depend on their repairs. And they must be able to cope with sickness, set broken bones, perform emergency **appendectomies**, and, in the worst of circumstances, watch a comrade die from injury or blood loss, knowing that he or she could easily have survived with timely treatment at a **terrestrial** hospital. Coping with these challenges will require an attitude adjustment and a lot of practice, and **screw-ups** are better handled closer to home.

The abrasive regolith is just one aspect of the moon's harsh environment. The **equator** promises relatively happy landings on relatively smooth surfaces, but it also guarantees temperatures that exceed 250 degrees Fahrenheit during the day and **plummet** below –240°F during the night — and both day and night last 14 Earth days. The Apollo astronauts did most of what they did during the lunar equivalent of early morning and forenoon — light enough to see but not as hot.

Climate is the main reason NASA announced last December that it would build its **outpost** near one of the lunar poles. The current favorite spot is the edge of Shackleton Crater[8] at the moon's South Pole, which is expected to feature "moderate" temperatures, between –50°F and 50°F. Shackleton also has the important advantage of being in sunlight — **albeit** weak sunlight — for up to 80 percent of the year. Abundant light will be crucial for generating electricity. If the base were built at the lunar equator, it would be in darkness for half of every month. During that time, solar-collecting **arrays** would be useless.

Another important attraction of the moon's poles is the possible presence of useful natural resources. Lunar **orbiters** in the 1990s detected concentrations of hydrogen, a potential resource for rocket fuel. Currently no one knows how much there is or what form it takes. Some scientists suspect that a **comet** may have **sideswiped** the moon long ago, leaving water ice buried in permanently shadowed craters. Identifying the source of the hydrogen is a key goal for the robotic missions that will **precede** the next landing by humans. The **downside** of a polar landing is that the landscape there is craggier and more forbidding than at the moon's midline, which makes landings more challenging. Nonetheless, NASA officials believe the advantages at the South Pole outweigh the risks.

No matter where the base is sited, astronauts on a prolonged lunar mission must contend with low gravity and radiation. Although the muscle- and bone-weakening effects of low gravity won't be a problem during the brief initial moon missions, shielding astronauts from damaging radiation exposure will be an immediate concern.

One idea is to wrap the lunar habitat in an envelope filled with radiation-absorbing water. Another is to **rig** an artificial magnetic field to **deflect** the worst rays. The easiest solution, however, will probably be to put the regolith to work: Simply place the habitat **modules** in a crater and bury them under a thick layer of moon dust.

How much regolith is necessary? Nobody knows. It is **conceivable** that radiation will cause chain reactions below the surface of the lunar soil, producing **fission** products from secondary reactions that are even more harmful to human tissue than unshielded **bombardment**.

So astronauts will have to dig into the regolith, and this will not be as easy as it sounds. First there is the challenge of getting heavy equipment into space. Then there are even more fundamental physics problems. Heavy machinery on Earth depends on friction and gravity to provide a stable **underpinning** while the machine's business end cuts, pushes, pulls, digs, scrapes, or pounds. On the moon, **inertia** is the same — **nudge** something and it will move with the same **vector** it has on Earth — but gravity is different. **Jab** too hard and the machine will jump. Twist too hard and the machine tips over.

One solution is to build a **bin** on the back of the **bulldozer** and fill it with regolith to make a **counterweight** before serious digging begins. Another is to **outfit** the bulldozer with **augers**, so it can screw itself into the lunar surface. As they **excavate** the moon, astronauts can count on being enveloped in clouds of dust, especially if they use a **sweeper**.

Moon dust is also a major unresolved issue for NASA's next-generation space suit. During the Apollo missions, three days of **abbreviated** moonwalks was about the limit before **zippers balked**, joints **stiffened**, and connectors began to **clog**. The new astronaut explorers must have a solution that will enable them to work there. It's fairly challenging.

Despite all its hazards, regolith may hold the answer, not just for blocking out radiation but also for providing building material for a self-sustaining outpost on the moon. The key lies in particles of glass and metallic iron in the lunar soil.

New Words

booted	*adj.*	穿着靴的
imprint	*n.*	烙印，印记
lunar	*adj.*	月的，月亮的，月球的
regolith	*n.*	［地质］风化层；土被
backdrop	*n.*	背景幕；（事件的）背景
vex	*v.*	使烦恼；恼怒
rocketry	*n.*	火箭学；火箭技术
virtually	*adv.*	几乎；事实上；实质上
boulder	*n.*	大石头，巨砾；圆石
nanometer	*n.*	纳米；十亿分之一公尺
diameter	*n.*	直径
puree	*n.*	泥；酱
micrometeorite	*n.*	微小陨石
unimpeded	*adj.*	未受阻止的，没受到阻碍的

accretion	*n.*	增长；冲积层；增添物
eon	*n.*	永世，无数的年代
agglomerate	*vt.*	使成团，使成块；使凝聚
jag	*vt.*	使成缺口；使成锯齿状
abrasive	*adj.*	研磨的；粗糙的
Mars	*n.*	［天文］火星
cripple	*vt.*	使致残；使跛；削弱；损坏
liability	*n.*	责任，义务；倾向；债务
pervasive	*adj.*	普遍深入的；无处不在的，遍布的
pernicious	*adj.*	有害的；毁灭性的
grind	*vt.*	磨（碎），碾（碎）；折磨
rim	*n.*	边；轮缘
havoc	*n.*	大破坏，浩劫
hydraulics	*n.*	水力学
bearing	*n.*	轴承；关系
pulmonary	*adj.*	肺部的
fibrosis	*n.*	［生］纤维症；纤维化
extract	*vt.*	拔出；榨取；吸取
ceramic	*n.*	陶瓷制品
cloak	*vt.*	掩藏，掩饰
dormant	*adj.*	睡眠状态的；静止的；隐匿的
mandate	*n./ vt.*	（书面）命令，训令；要求
hurdle	*n.*	障碍
precursor	*n.*	先驱；初期形式
orion	*n.*	［天］猎户星座
loft	*vt.*	推入高弧线；升高
dust-ridden	*adj.*	满是尘土的
prolonged	*adj.*	延长的；拖延的
cosmic	*adj.*	宇宙的
sortie	*n.*	突围；战斗飞行器执行任务的一次飞行
eventually	*adv.*	最后，终于
infrastructure	*n.*	基础；基础设施
daunting	*adj.*	使人畏缩的
barrage	*n.*	一连串
cramp	*vt.*	关住；限制，约束
calibrate	*vt.*	校准
lethal	*adj.*	致命的

consumable	*n.*	耗材
appendectomy	*n.*	阑尾切除术
terrestrial	*adj.*	地球的；陆地的
screw-up	*n.*	一团糟，乱七八糟
equator	*n.*	赤道
plummet	*vi.*	骤降，暴跌
outpost	*n.*	前哨
albeit	*conj.*	虽然
array	*n.*	排列；编队；大批
orbiter	*n.*	盘旋物；人造卫星
comet	*n.*	彗星
sideswipe	*vt.*	擦边撞击
precede	*vt.*	领先（于）；在……之前，先于
downside	*n.*	底侧；下降趋势
rig	*v.*	配备，装配
deflect	*v.*	（使）偏斜，（使）偏转
module	*n.*	模数，模块；登月舱；指令舱
conceivable	*adj.*	可能的；想得到的，可想象的
fission	*n.*	裂开，分裂
bombardment	*n.*	炮击，轰击
underpinning	*n.*	基础；支柱，支撑
inertia	*n.*	惯性；惯量
nudge	*vt.*	轻推；靠近
vector	*n.*	［数］向量，矢量
jab	*vi.*	猛刺；击，打
bin	*n.*	容器；箱子；仓
bulldozer	*n.*	推土机
counterweight	*n.*	平衡物；秤锤；平衡力
outfit	*vt.*	配备，装备
auger	*n.*	螺丝钻
excavate	*vt.*	挖掘，开凿；挖出；挖空
sweeper	*n.*	清洁机
abbreviated	*adj.*	简短的
zipper	*n.*	拉链
balk	*vi.*	突然停止并拒绝前进
stiffen	*vt.*	使硬；使僵硬；使生硬
clog	*v.*	障碍；阻塞

Expressions

cling to	依附；依靠；坚持
grind to a halt	［口］慢慢停了下来
play havoc with	对……造成严重破坏；使……陷入大混乱
beyond dispute	没有争论余地；无疑地
settle in	迁入
cope with	与……竞争；应付
contend with	对付
block out	封闭

Notes

1. **Neil Armstrong**：尼尔·阿姆斯特朗，第一个登上月球的宇航员。1969年7月16日作为“阿波罗11号”飞船驾驶长开始执行登月任务。7月20日他首先登上月球表面，宣告说：“这是一个人的一小步，却是全人类的一大飞跃。”
2. **Apollo**：“阿波罗号”飞船是美国实施载人登月过程中使用的飞船。“阿波罗11号”飞船于1969年 7月20 — 21日首次实现人类登上月球的理想。飞船由指挥舱、服务舱和登月舱3个部分组成，其中指挥舱是全飞船的控制中心，也是航天员飞行中生活和工作的座舱；服务舱采用轻金属蜂窝结构，周围分为6个隔舱，容纳主发动机、推进剂贮箱和增压、姿态控制、电气等系统。前端与指挥舱对接，后端有推进系统主发动机喷管：登月舱由下降级和上升级组成。
3. **Grape Nuts**：一种谷物早餐，可增强健康。又译为葡萄仁麦片，现已成为一个著名品牌。
4. **Vision for Space Exploration**：美国总统布什2004年11月宣布，美国宇航员计划在2015年重返月球，并在月球建立永久性基地，作为美国探索太空的“中转站”，进而实现人类登陆火星的梦想。
5. **NASA**：National Aeronautics and Space Administration，美国国家航空航天局。它是美国联邦政府的一个政府机构，负责美国的太空计划。1958年7月29日，艾森豪威尔总统签署了《美国公共法案85-568》，创立了NASA，总部位于华盛顿哥伦比亚特区。美国国家航空航天局的目标是“理解并保护我们赖以生存的行星；探索宇宙，找到地球外的生

命；启示我们的下一代去探索宇宙”。在太空计划之外，美国国家航空航天局还进行长期的民用以及军用航空太空研究。

6. **Orion Spaceship**：猎户座飞船，NASA新一代载人航天器。这种新型的航天器将接替事故频频的航天飞机成为向国际空间站输送人员、重返月球，甚至登陆火星的载人航天器。
7. **International Space Station**：国际空间站。国际空间站的设想是1983年由美国总统里根首先提出的，即在国际合作的基础上建造迄今为止最大的载人空间站。经过近十余年的探索和多次重新设计，直到前苏联解体、俄罗斯加盟，国际空间站才于1993年完成设计，开始实施。该空间站以美国、俄罗斯为首，包括加拿大、日本、巴西和欧空局（11个国家）共16个国家参与研制。
8. **Shackleton Crater**：月球南极的沙克尔顿火山口，几乎永久受日光照射。

Exercises

I. Understanding the text.

1. The fine gray dust on the surface of the moon was named ________.
   A. lunar regolith
   B. landscape
   C. backdrop
   D. imprint
2. Which of the following doesn't belong to the biggest challenges to lunar settlement?
   A. Radiation.
   B. New rocketry.
   C. Micrometeorites.
   D. Livings with regolith.
3. The word “it” in Paragraph 2, Line 4 refers to ________.
   A. puree
   B. moon
   C. surface
   D. regolith
4. Humans' lunar exploration may include the following purposes except ________.
   A. mining resources
   B. walking around on the surface
   C. training for exploring the Mars
   D. installing high-precision observatories