History 历史 lìshǐ of Architecture 建筑学 jiànzhùxué

Lesson Plan (教案 jiào'àn) Goals (**目标** mùbiāo)

1. What trends (趋势 qūshì) can be found in the architectures of China, Europe (欧洲) and the Islamic (伊斯兰教的) world?
2. The history of architecture is really the history of making increasingly (越来越 yuèláiyuè) large (大) interior (室内 shìnèi) space (空间 kōngjiān) without pillars (pillar = column 支柱 zhīzhù) all over the place. This requires [=needs (需要 xūyào]) better design (建筑设计 jiànzhùshèjì) and materials (建筑材料 jiàn zhù cái liào).
3. Use of symbolism (象征 xiàng​zhēng​ ; 代表 dàibiǎo)
4. Understand the similarities (相似的 xiāng sì de) and differences (差异 chāyì) between Chinese, European (欧洲的 ōuzhōude) and Islamic (伊斯兰教的 yīsīlánjiàode) architecture.
5. What were the main (主要 zhǔyào) features (特点 tèdiǎn) of Chinese architecture?
* Use of interlocking beams 斗拱 *dǒugǒng* (not nails)
* Feng shui & symbolism (象征 xiàng​zhēng​ ; 代表 dàibiǎo) in design (图案 tú'àn) and art
* Use of wood in construction (木材 mùcái)
1. What were the main features of European architecture?
* Increasingly large arches (拱状 gǒng zhuàng) that even went outside (户外的 hùwài de) the building

For example: flying buttresses

* Christian (基督教 jīdūjiào) symbolism (象征 xiàng​zhēng​ ; 代表 dàibiǎo)
* Use of stone (石头 shítou) in construction
1. What were the main features of Islamic architecture?
* Use of increasingly large domes (yuánwūdǐng ; 穹 qióng)
* Islamic symbolism & geometric designs (图案 tú'àn)
1. Who used iron (铁 tiě) in construction first, Chinese or European?
* Chinese used it centuries before Europeans
1. Modern (现代 xiàndài) architecture often uses lots of glass (玻璃 bōli) and steel (钢铁 gāngtiě) and has a modular (模块单元 mó kuài dān yuán) design. What was the first building that used lots of glass and iron and had a modular design?
* Joseph Paxton's “Crystal Palace” built for the [Great Exhibition](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=myh#myh) of 1851 in England.

|  |
| --- |
| ACE 公元 gōngyuán |
| Age 时代 shí​dài​ |
| Aisle = corridor 走廊 zǒuláng |
| Aqueduct 输水道 shū shuǐ dào |
| Arch 拱状 gǒng zhuàng |
| Architectural Design 建筑设计 jiànzhùshèjì |
| Architecture 建筑学 jiànzhùxué Vocabulary  |
| Asia 亚洲  |
| Basilica 带有圆顶的巴西利卡式教堂 dài yǒu yuán dǐng de bā xī lì kǎ shì jiào táng |
| BCE 公元前 gōng​yuán​qián​ |
| Beam 梁 liáng |
| Bernini 贝尔尼尼 Bèi'ěrníní (Italian architect)  |
| [Byzantine](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=frw#frw) architecture 拜占庭式建筑 Bài​zhàn​tíng​ [shì​](http://www.mdbg.net/chindict/chindict.php?page=worddict&wdrst=0&wdqb=%E6%8B%9C%E5%8D%A0%E5%BA%AD%E5%BC%8F%E5%BB%BA%E7%AD%91)jiàn​zhù​ |
| Bones 骨头gǔtou |
| Border (边界 biānjiè |
| Breadth 宽度 kuāndù |
| Brick 砖 zhuān |
| Bridge 桥 qiáo |
| Buddhist 佛教的 fójiàode |
| Build/ (past tense: built) = Construct 建设 jiànshè |
| Building 建筑物 jiànzhùwù |
| Burial 葬礼 zànglǐ  |
| Burned down 烧毁 shāohuǐ |
| [Cairo](http://en.wikipedia.org/wiki/Cairo%2C_Egypt) 开罗 kāiluó |
| Castle 古堡 gǔbǎo |
| Cathedral 大教堂 dàjiàotáng |
| Cement 水泥 shuǐní |
| Church 教堂 jiàotáng |
| Christian 基督教 jīdūjiào |
| Circular 圆形的 yuán xíng de |
| Civilization (noun) 文明 wénmíng (civilized) |
| Column = pillars 支柱 zhīzhù |
| Concrete 混凝土 hùnníngtǔ (concrete + sand + water = cement) |
| Conquered 征服 zhēngfú |
| Constantinople 康斯坦丁诺普尔 Kāngsītǎndīngnuòpǔ'ěr |
| Construction material 建筑材料 jiàn zhù cái liào |
| Courtyard 大院 dà​yuàn |
| Crusade 十字军东征 shí zì jūn dōng zhēng |
| Curve 曲线 qūxiàn |
| Depth 深度 shēndù |
| Design 图案 tú'àn |
| Difference (between people & things) 差异 chāyì |
| Dome 圆屋顶 yuánwūdǐng ; 穹 qióng |
| Dynasty 朝 cháo |
| Earth 泥土 nítǔ  |
| Earthquake 地震 dì​zhèn​ |
| Egypt (country) 埃及 āijí /Egyptian (the people) |
| Emperor 皇帝 huángdì |
| Europe/European 欧洲 ōuzhōu 欧洲的 ōuzhōude |
| Evil 邪恶 xié'è |
| Feature = characteristic 特点 tèdiǎn |
| Feng Shui 风水 fēng​shuǐ  |
| Foundation 地基 dì​jī​ |
| Frame 框架 kuàngjià |
| Fusion 融合 rónghé |
| Geometric 几何 jǐhé |
| Glass 玻璃 bōli |
| Gothic Architecture (哥特式建筑 gē tè shì jiàn zhù) |
| Granite 花岗石 huāgāngshí |
| Gravity 重力 zhòng lì |
| Greece 希腊 xīlà |
| Harvest 收成 shōucheng |
| Height 高度 gāodù |
| Hindu 印度教信徒 yìndùjiāoxìntú |
| Heavy 重的 chóng de zhong de  |
| huge = vast = gigantic = massive = very, very big (**big = large**) 巨大的 jùdàde |
| Impressive 神气 shénqì 威风 wēifēng  |
| Increasing(ly) 越来越 yuèláiyuè  |
| Interior 室内 shìnèi |
| Interlocking 斗拱 *dǒugǒng* **;** 错 cuò 参差 |
| Invention 发明 fāmíng |
| Iran 伊朗 yīlǎng |
| Iron 铁 tiě |
| Islamic 伊斯兰教的 yīsīlánjiàode  |
| Islamic Architecture 伊斯兰建筑 yī sī lán jiàn zhù.  |
| Jerusalem 耶路撒冷 yēlùsālěng |
| Keystone 标砖 biāo​zhuān​ |
| Length 长度 chángdù |
| Lever 杠杆 gànggǎn |
| Library 图书馆 tú shū guǎn (=archive) |
| Lightning 闪电 shǎndiàn |
| Lintel 楣 méi |
| Main = major = dominant = primary 主要 zhǔyàode |
| Marble 大理石 dàlǐshí |
| Medieval 中世纪的 zhōngshìjìde |
| Model 榜样 bǎngyàng |
| Modern 现代 xiàndài |
| Module (noun) Modular (adjective) 模块单元 mó kuài dān yuán |
| Muslim 穆斯林 mùsīlín |
| Nail 钉子 dīngzi |
| Need 需要 xūyào (=require) |
| Neighbor 邻居 línjū |
| Outside 户外的 hùwài de |
| Pagoda 塔 tǎ |
| Pantheon 罗马万神庙 Luómǎ wàn Shénmiào |
| Palace (noun) 宫 gōng (Adjective: Palatial)  |
| Pillar = Column 支柱 zhīzhù |
| Pompeii 庞贝 pang bèi |
| Pray 祈祷 qídǎo |
| Prefabrication 工厂预制 gōng chǎng yù zhì |
| Protect (保护 bǎohù |
| Pyramid 金字塔 jīnzìtǎ |
| Pyramids at Giza 埃及金字塔 Āijí Jīnzìtǎ |
| Rectangular 矩形 jǔxíng |
| Religious 宗教的 zōngjiàode |
| [Renaissance](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=fcb#fcb) 文艺复兴 Wén​yì​fù​xīng​ |
| Require 需要 xūyào (=need) |
| Rome 罗马 luómǎ |
| Roof 屋顶 wūdǐng |
| Saint Peter’s Cathedral (St. Peter’s in Rome) 圣彼得 Shèng​ Bǐ​dé​ 大教堂 dà​jiào​táng​ |
| Season 季节 jìjié |
| Secular 非宗教的 fēizōngjiàode |
| Silk Road 丝绸之路 sīchóuzhīlù |
| Similar (adjective) Similarity (noun) 相似的 xiāng sì de |
| Space 空间 kōngjiān |
| Span 跨度 kuàdù |
| Stability 稳定 wěndìng |
| Stained glass windows 有色玻璃窗 yǒu sè bō lí chuāng (first found in Gothic architecture) |
| Steel 钢铁 gāngtiě |
| Stone 石头 shítou |
| Stonehenge 巨石阵 Jùshízhèn |
| Straight 笔直的 bǐzhíde |
| Stupa 塔 tǎ |
| Support 支撑 zhīchēng |
| Survive (verb) survival (noun) 幸存 xìngcún |
| Symbol (noun) Symbolize (verb) 象征 xiàng​zhēng​ ; 代表 dàibiǎo |
| Tallest 最高 zuìgāo |
| Technology 技术 jìshù |
| Temple 庙宇 miàoyǔ |
| Temple of Heaven 天坛 tiāntán |
| Tibetan 西藏的 Xīzàng |
| Tile (roof tile) 琉璃瓦 liúliwǎ |
| Tomb 坟墓 fénmù |
| Ton 英吨 yīng dūn = 2,000 pounds (909.09 Kilos) |
| Tower 塔 tǎ (also see Pagoda and Stupa) |
| Traditional 传统的 chuántǒngde |
| Trend 趋势 qūshì |
| [UNESCO](http://en.wikipedia.org/wiki/UNESCO) 联合国教科文组织 liánhéguójiàokēwénzǔzhī |
| Vault 穹 qióng |
| Wall 墙 qiáng |
| Western 西方 xīfāng |
| Width 宽度 kuāndù |
| Wood 木材 mùcái |
| World Heritage (site) 世界遗产 shìjièyíchǎn |
| Worship 崇拜 chóngbài |

**The history of architecture is really the history of making increasingly (**越来越 yuèláiyuè**) large (**大**) interior (室内 shìnèi) space (空间 kōngjiān) without pillars (pillar = column 支柱 zhīzhù) all over the place. This requires better design (建筑设计 jiànzhùshèjì) and materials (建筑材料 jiàn zhù cái liào).**

**2630 BCE – Egypt** 埃及 āijí

The oldest Egyptian pyramids (金字塔 jīnzìtǎ) were built (建设 jiànshè) about 2630 BCE–2611 BCE. The most famous Egyptian pyramids are those found at [Giza](http://en.wikipedia.org/wiki/Giza_pyramid_complex) (埃及金字塔 Āijí Jīnzìtǎ) (2589–2566 BCE), outside [Cairo](http://en.wikipedia.org/wiki/Cairo%2C_Egypt) (开罗 kāiluó). Several of the Giza pyramids are counted among the largest (=biggest) buildings ever built. Impressive (神气 shénqì; 威风 wēifēng) they are, but they had very little interior (室内 shìnèi) space (空间 kōngjiān). They were built for the burial (葬礼 zànglǐ) of their kings called “Pharaohs” (法老 fǎlǎo).

2400–2200 BCE - England

**Stonehenge** (巨石阵 Jùshízhèn) is in England. Stonehenge served as a [burial (葬礼 zànglǐ) ground](http://en.wikipedia.org/wiki/Burial_ground) from its earliest beginnings. Human bones (骨头gǔtou) from as early as 3000 BC were found.

**7th Century BCE – 206 BCE China**

This was the beginning of the Great Wall of China (长城 chángchéng) which was built (建设 jiànshè) of stone (石头 shítou), brick (砖 zhuān), [earth](http://en.wikipedia.org/wiki/Rammed_earth) (泥土 nítǔ), wood 木材 mùcái, and other materials. along an east-to-west line across the northern borders (边界 biānjiè) of [China](http://en.wikipedia.org/wiki/China) in part to protect (保护 bǎohù) the Chinese Empire. Between 220–206 BCE the first [Emperor of China](http://en.wikipedia.org/wiki/Emperor_of_China), [Qin Shi Huang](http://en.wikipedia.org/wiki/Qin_Shi_Huang) greatly strengthened and expanded the Great Wall, and it was made stronger and longer again in the Ming Dynasty (朝 cháo; 14th Century), to a total length (长度 chángdù) of around 21,196 km.

**GREECE** 希腊 xīlà **AND ROME** 罗马 luómǎ

In Greek architecture a single stone lintel (楣 méi) can reach between columns (= pillars 支柱 zhīzhù) at most 6.5 meters apart. A Roman brick (砖 zhuān) arch (拱状 gǒng zhuàng) can span (跨度 kuàdù) 50 meters.

The Roman invention (发明 fāmíng) of concrete (混凝土 hùnníngtǔ) helped their architecture a lot.

**Basilicas**

The Roman public hall, known as a basilica, (带有圆顶的巴西利卡式教堂 dài yǒu yuán dǐng de bā xī lì kǎ shì jiào tang) is a rectangular (矩形 jǔxíng) building with side aisles (走廊 zǒuláng) behind the rows of columns (支柱 zhīzhù) which support (支撑 zhīchēng) the main walls (墙 qiáng). A building of this kind is known from [Pompeii](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=dvm#dvm) (庞贝 pang bèi) in the 2nd century BCE.

**Chinese and European Architecture**

Chinese architecture is different from Western in that length (长度 chángdù) and breadth (宽度 kuāndù = width) are more important than height 高度 gāodù, as in Western (西方 xīfāng) European (欧洲 ōuzhōu).

Also, Chinese architecture uses a lot of Feng Shui (风水 fēng​shuǐ) like the use of the Screen walls (屏风 píng​fēng​) to face the main entrance (入口 rùkǒu) of the house, because of the belief that evil (邪恶 xié'è) things travel in straight 笔直的 bǐzhíde lines.

Also, Western (西方 xīfāng) buildings usually have a yard in front (**前院** qiányuàn) and back, but in traditional Chinese architecture, there is often or usually a courtyard (大院 dà​yuàn)​ in the middle. (sì​hé​yuàn​ 四合院).

Another difference between Chinese and Western architecture is that ancient Chinese architects usually used wood (木材 mùcái) frames (框架 kuàngjià) made with interlocking (斗拱 *dǒugǒng*) logs (原木 yuán mù) not with the use of nails (钉子 dīngzi). Stability (稳定 wěndìng) is helped by using of heavy (重的 chóng de) beams (梁 liáng) and roofs (屋顶 wūdǐng).

But, like Western architecture, Chinese architecture likes things big, very big! That’s usually because kings and emperors like things big to show how great they are.

**1st Century BCE (-100 🡪 year O)**

An interesting architectural design of southeast Asia (亚洲 yàzhōu) is the Buddhist stupa (Stupa 塔 tǎ), known in India (印度) from before the 1st century BCE. The stupa provides the architectural model (榜样 bǎngyàng) for Hindu (印度教信徒 yìndùjiāoxìntú) temples in India, for Buddhist (佛教的 fójiàode) temples in southeast Asia and for pagodas (塔 tǎ) in China and Japan.

In the hands of Chinese and Japanese carpenters, this type of stupa evolves into the tall and slender wooden pagoda. A superb example, from as early as AD 607, survives in Japan in the Horyuji temple at Nara. Buddhism makes its way towards China along the [Silk Road](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=bfy#bfy) (丝绸之路 sīchóuzhīlù). From China many religions (宗教的 zōngjiàode) and technologies (技术 jìshù) moved to Japan.

**Roman aqueducts** (输水道 shū shuǐ dào)

For example, in about 20 ACE they built the great aqueduct (输水道 shū shuǐ dào) at Nîmes, known as the Pont du Gard - Bridge of the Gard. (bridge (桥 qiáo) This aqueduct was made to bring water from the river Eure to the new Roman town of Nîmes. The water flows gently downhill for a distance of almost 50 km. The Pont du Gard, with its three towering tiers of arches (拱状 gǒng zhuàng), carries it over the deep valley of the river Gard.

**Roman Colosseum** 72 ACE

Seated 50,000 spectators and was used for [gladiatorial](http://en.wikipedia.org/wiki/Gladiatorial) 角斗士 jiǎo​dòu​shì​ fighting. The architecture was beautiful but what went on inside not so beautiful.

**CHINA**

A [vaulted](http://en.wikipedia.org/wiki/Vault_%28architecture%29) (穹 qióng) tomb (坟墓 fénmù) chamber in [Luoyang](http://en.wikipedia.org/wiki/Luoyang), built during the [Eastern Han Dynasty](http://en.wikipedia.org/wiki/Eastern_Han_Dynasty) (AD 25–220) shows use of arches (拱状 gǒng zhuàng) and vaults. A tomb (坟墓 fénmù) chamber of [Luoyang](http://en.wikipedia.org/wiki/Luoyang), built during the [Eastern Han Dynasty](http://en.wikipedia.org/wiki/Eastern_Han_Dynasty) (AD 25–220) shows they were **using arches too**.

**Roman Bridges**

Some of the most impressive (神气 shénqì) architecture is Roman bridges (桥 qiáo). A fine surviving example, built in ACE 105, spans the Tagus in Spain, at Alcántara. Its two very wide central arches, above the river, are made of granite (花岗石 huāgāngshí). Each block weighs 8 tons 英吨 yīng dūn = 2,000 pounds (909.09 Kilos). Another famous Roman bridge is the the Sant'Angelo bridge, built for Hadrian in ACE 134 ACE.

**Pantheon (**罗马万神庙) **in Rome**

The roof (屋顶 wūdǐng) of the Pantheon in Rome is the most amazing example of the Roman genius. For example, in the center of the arches (万神殿式圆屋顶 wàn shén diàn shì yuán wū) is a circular (圆形的 yuán xíng de) open space. The Pantheon, built by [Hadrian](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=dah#dah) in about AD 120, has been a place of worship (崇拜 chóngbài) for nearly 2000 years. For most of that time it has been a Christian church.

**4th Century ACE (= 300 – 399 ACE)**

When Emperor (皇帝) [Constantine](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=dfw#dfw) (康斯坦汀 kāngsītǎntīng) made Christian churches as public buildings in the 4th century ACE, the basilica (带有圆顶的巴西利卡式教堂 dài yǒu yuán dǐng de bā xī lì kǎ shì jiào táng) was the form he chose. The three great churches (教堂 jiàotáng) founded by Constantine in Rome are all basilicas, i.e. St. Peters. 圣彼得 Shèng​ Bǐ​dé​ 大教堂 dà​jiào​táng​

**537 ACE**

In Santa Sophia in Constantinople (康斯坦丁诺普尔 Kāngsītǎndīngnuòpǔ'ěr - built in only five years) the architects invented a new and amazing technology - placing a vast circular (圆形的 yuán xíng de) dome on top of a square formed of four arches in the now world famous [Justinian](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=egg#egg) achieve.

**625 ACE**

The [Giant Wild Goose Pagoda](http://en.wikipedia.org/wiki/Giant_Wild_Goose_Pagoda) (大雁塔 Dà​yàn​tǎ​) in [Xi'an](http://en.wikipedia.org/wiki/Xi%27an), built in 652 during the [Tang Dynasty](http://en.wikipedia.org/wiki/Tang_Dynasty) is a massive (巨大的 jùdàde), very tall beautiful multi-story structure.

**691 ACE**

The Dome (圆屋顶 yuánwūdǐng ; 穹 qióng) of the Rock, completed in 691 and the earliest surviving example of Muslim (穆斯林 mùsīlín) architecture, borrows in the design of [domed roof](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=doy#doy). Jerusalem (耶路撒冷 yēlùsālěng), taken from the Christians only half a century previously (50 years), still has the skills and crafts first developed for use in imperial churches.

This shrine made the dome (圆屋顶 yuánwūdǐng ; 穹 qióng) a feature of Islamic architecture 伊斯兰建筑 yī sī lán jiàn zhù.

**9th & 11th Centuries – China**

**Dougong** 斗拱 inside the East Hall timber hall of [Foguang Temple](http://en.wikipedia.org/wiki/Foguang_Temple) (庙宇 miàoyǔ), built in 857 during the [Tang Dynasty](http://en.wikipedia.org/wiki/Tang_Dynasty) used bracket arms, and interlocking wooden [brackets](http://en.wikipedia.org/wiki/Bracket_%28architecture%29) (斗拱; *dǒugǒng*), one of the most important elements in traditional [Chinese](http://en.wikipedia.org/wiki/Chinese_architecture) architecture.) They didn’t use nails (钉子 dīngzi).

The [Three Pagodas](http://en.wikipedia.org/wiki/Three_Pagodas) of Chong Sheng Temple, Dali City, [Yunnan](http://en.wikipedia.org/wiki/Yunnan), built in the 9th and 10th century is amazing!

**1001 – 1055 ACE**

The **Liaodi Pagoda** (料敌塔; [pinyin](http://en.wikipedia.org/wiki/Pinyin): Liàodí Tǎ; [Wade–Giles](http://en.wikipedia.org/wiki/Wade%E2%80%93Giles): Liaoti T'a) of Kaiyuan Monastery, [Dingzhou](http://en.wikipedia.org/wiki/Dingzhou), [Hebei](http://en.wikipedia.org/wiki/Hebei) Province, [China](http://en.wikipedia.org/wiki/China) is the tallest existing pre-modern [Chinese pagoda](http://en.wikipedia.org/wiki/Chinese_pagoda) and tallest (最高 zuìgāo) [brick](http://en.wikipedia.org/wiki/Brick) (砖 zhuān) pagoda (塔 tǎ) in the world, built in the 11th century during the [Song Dynasty](http://en.wikipedia.org/wiki/Song_Dynasty) (960-1279). It has survived (幸存 xìngcún) several earthquakes (地震 dì​zhèn​). From the outside, the pagoda seems to have only five stories yet the pagoda's inside really has nine stories. The pagoda features fifty-four different kinds of **bracket arms** in its construction. (斗拱 dǒugǒng).

**9th – 13th Centuries European (**欧洲 ōuzhōu**) Medieval (**中世纪的 zhōngshìjìde**) castles** 古堡 gǔbǎo

During the 12th century stone (石头 shítou) walls (墙 qiáng) and towers (塔 tǎ) become more common in European castles.

One influence is the [Byzantine](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=frw#frw) architecture (拜占庭式建筑 Bài​zhàn​tíng​ [shì​](http://www.mdbg.net/chindict/chindict.php?page=worddict&wdrst=0&wdqb=%E6%8B%9C%E5%8D%A0%E5%BA%AD%E5%BC%8F%E5%BB%BA%E7%AD%91)jiàn​zhù​) of castles seen by the crusaders (十字军战士) on their way east. They soon create in the Holy Land magnificently impressive (神气 shénqì) examples of their own - such as the great Krak des Chevaliers, largely built by the [Knights of St John](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=fos#fos) and occupied by them from 1142.

**1103 - China**

At the same time in China they had an advanced (先进的) system of architecture that was very different. This is an original picture from the *Yingzao Fashi* standard building manual published by the Chinese official and architect Li Jie in the year 1103, during the Song Dynasty. The curve (曲线 qūxiàn) of the roof (屋顶 wūdǐng) is well seen. Lever (杠杆 gànggǎn) arms are also present. (This picture appears on page 96 of Joseph Needham's book *Science and Civilization in China: Volume 4, Part 3, Civil Engineering and Nautics*.)

**1406-1420 CHINA**

The **Forbidden City (故宫 gùgōng)** was built between 1406 and 1420. It has 980 buildings and covers 720,000 m2 and traditional (传统的 chuántǒngde) [Chinese palatial (宫 gōng) architecture](http://en.wikipedia.org/wiki/Chinese_architecture), and has influenced cultural and architectural developments in East Asia and elsewhere. The Forbidden City was declared a [World Heritage Site](http://en.wikipedia.org/wiki/World_Heritage_Site) (世界遗产 shìjièyíchǎn) in 1987 and is listed by [UNESCO](http://en.wikipedia.org/wiki/UNESCO) (联合国教科文组织 liánhéguójiàokēwénzǔzhī as the largest collection of preserved ancient wooden structures in the world.

Also during this time the Temple of Heaven (天坛 tiāntán) was built. The *Hall of Prayer for Good Harvests* (祈年殿 qí nián diàn) is a circular (圆形的 yuán xíng de) building, 36 meters in diameter and 38 meters tall, built on three levels of [marble](http://en.wikipedia.org/wiki/Marble) (大理石 dàlǐshí) stone foundation (地基 dì​jī​), where the Emperor (皇帝 huángdì) prayed (祈祷 qídǎo) for good harvests (收成 shōucheng). The building is completely wooden (木材 mùcái), with no nails (钉子 dīngzi). The *Hall of Prayer for Good Harvests* has four inner, twelve middle and twelve outer [pillars](http://en.wikipedia.org/wiki/Column) (支柱 zhīzhù), representing the four [seasons](http://en.wikipedia.org/wiki/Season) (季节 jìjié), twelve months and twelve traditional Chinese hours. All the buildings within the Temple have special dark blue roof (屋顶 wūdǐng) tiles (琉璃瓦 liúliwǎ), representing the Heaven.

The original building was burned down (烧毁 shāohuǐ) by a fire caused by lightning (闪电 shǎndiàn) in 1889. The current building was re-built several years later.

**GOTHIC Architecture (**哥特式建筑 **gē tè shì jiàn zhù) 12th – 15th Centuries - Europe**

The [Gothic style](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=ffd#ffd), though also used in secular buildings, is most associated with the great cathedrals (大教堂 dàjiàotáng) of Europe. There are certain immediately recognizable characteristics in any Gothic cathedral.

The interior gives an impression of lightness (重量轻 zhòngliàng qīng) and height (高度 gāodù), with slender columns framing large tall windows and reaching up to support a delicately ribbed stone roof and [flying buttresses](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=fem#fem).

[Stained glass](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?historyid=186) windows 有色玻璃窗 yǒu sè bō lí chuāng are part of the glories of Gothic cathedrals from the 12th century.

The last flowering of Italian Gothic is the most beautiful style of all and can be found in the secular (非宗教的 fēizōngjiàode) architecture of late medieval Venice (威尼斯). An exceptional example is the Doge's Palace, built in its present form between 1340 and about 1500.

**14th – 15 Centuries - Domes (**圆屋顶 yuánwūdǐng ; 穹 qióng**) in Islamic Architecture** (伊斯兰建筑 yī sī lán jiàn zhù)

The domes became bigger and more important over time, examples in the 14th century are a [Mongol](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=exf#exf) tomb at Soltaniyeh in northern Iran (伊朗 yīlǎng), [Mameluke](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=exj#exj) tombs in Cairo and a [Tughluq](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=fhd#fhd) tomb in Delhi. The tomb of [Timur](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=fira#fira) in Samarkand, with its swelling dome of blue tiles, is of the early 15th century.

**16th – 17th Centuries**

Thus both Islam and Christianity, arriving at the same point from different directions, make the 16th and 17th centuries the [age (时代 shí​dài) of the dome](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=hgg#hgg) (圆屋顶 yuánwūdǐng ; 穹 qióng). Islam moves steadily (稳步 wěn​bù​) towards this point. Christianity reaches it when the [Renaissance](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=fcb#fcb) (文艺复兴 Wén​yì​fù​xīng​) breaks the long medieval traditions of [Romanesque](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=euq#euq) and [Gothic](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=fej#fej).

Rome (罗马 luómǎ) achieves the most impressive (神气 shénqì ; 威风 wēifēng) dome of the 16th century, with the completion of [St Peter's](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=hng#hng) (圣彼得 Shèng​ Bǐ​dé​ 大教堂 dà​jiào​táng) in 1590. This cathedral (大教堂 dàjiàotáng) is still the largest in the world. This dome structure was also used in the Capital Building in Washington D.C.

**17th century ACE Bernini (**贝尔尼尼 Bèi'ěrníní Italian architect)**) and baroque Rome**
Giovanni Lorenzo Bernini was appointed architect to [St Peter's](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=hng#hng). in 1629.
Maybe his most famous work completed in 1633 is known as the Baldacchino, and is at the very heart of the church. This was the time of the Renaissance in Europe…!

**1767 -1771 China (18th Century)**

[Putuo Zongcheng Temple](http://en.wikipedia.org/wiki/Putuo_Zongcheng_Temple), built from 1767 to 1771 during the reign of [Qianlong](http://en.wikipedia.org/wiki/Qianlong_Emperor), represents a fusion (融合 rónghé) of Chinese and Tibetan (西藏的 Xīzàng) architectural style. [Buddhist](http://en.wikipedia.org/wiki/Buddhist) (佛教的 fójiàode) temple complex built during the time of [Qianlong Emperor](http://en.wikipedia.org/wiki/Qianlong_Emperor) (1735–1796).

**19th Century (1800s) – Europe**

The first half of the 19th-century in Europe started with the architecture of the past mixing a lot of older styles together, like Greek temples and Gothic cathedrals, but soon extended to encompass a confusing range of other historical styles - Egyptian, Byzantine, Romanesque, Venetian Gothic, Muslim Indian, and even, in a final convolution, the many Renaissance styles which are themselves a response to earlier periods.

**Beginning of the modern age – Europe - Glass, iron and prefabrication: AD 1837-1851**

The public first becomes aware of the glorious potential of cast-iron architecture in the 1840s, when extraordinary conservatories are erected at Chatsworth and in Kew Gardens.

The occasional use of cast iron for structural purposes goes back many centuries in [China](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=bbj#bbj), for temple pagodas, but it was new in Britain when William Strutt builds the first fireproof mill at Derby, in 1792-3, with floors on shallow brick arches supported on cast-iron pillars.

But it is Joseph Paxton's building for the [Great Exhibition](http://www.historyworld.net/wrldhis/PlainTextHistories.asp?gtrack=pthc&ParagraphID=myh#myh) of 1851, the astonishing Crystal Palace, which reveals to the millions the potential of the new architecture. The statistics of the Crystal Palace are bewildering (3300 iron columns, 2150 iron girders, 250 miles of sash bar, 293,635 panes of glass. It was the first really huge iron and glass building – much like many glass and steel buildings today.